April 5, 1948

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 35

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Is mighty mean
He loves to go
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Machinery whirrs
And frustrate
Man-u-fact-u-rers
By bearing down
On shafts and wheels
With his abrasive
Toes and heels
Which rub and rub
And rub and rub
And rub away
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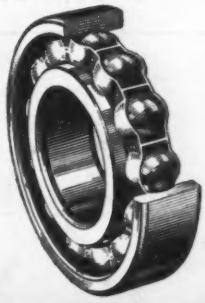

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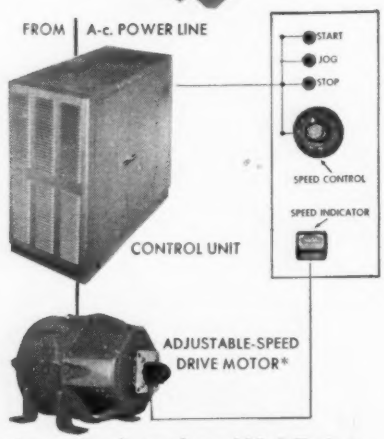

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STEEL

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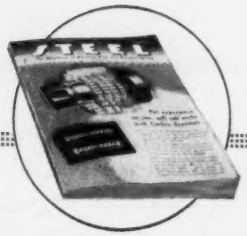


April 5, 1948

A Foot in the Door

Since World War II the United States has shipped to Russia a considerable volume of equipment and machinery for the iron, steel and metalworking industries. Much of the goods shipped was of the most modern and efficient design our engineers have been able to develop. In some instances we actually shipped new improved models to the USSR even before they were made available to customers in the United States.

As relations between the two countries deteriorated, this once liberal attitude was modified in various ways. Some American exporters reduced or stopped shipments on their own initiative. The government recently banned certain types of shipments. There are other official and unofficial curbs.

This hit-or-miss policy needs clarification. There should be a well-considered plan to which equipment exporters and government agencies can conform. To ban all exports to Russia, as some Congressmen propose, is not the correct answer at this stage. Nor is the loose plan of permitting everything but actual munitions to go through to Russia a sound solution.

For the most likely approach to this delicate problem, our authorities could well consult the British and American diplomats and others who have had the most experience in dealing with opposite numbers in the USSR. Many veterans in this hectic field of verbal and written give-and-take will testify that while the endless bickering is time consuming, discouraging and sometimes futile, it does on occasion result in bargaining advantageous to both sides.

As long as we maintain diplomatic relations with our former ally, it may be good policy to keep a foot in the door of economic relations. We should have expert negotiators who are familiar with these stern Asiatic codes of barter. They should be authorized to attempt to trade something we have that Russia wants and whose shipment to her will not hurt us for something that the Kremlin is willing to ship us.

If economic bargaining on this scale fails, we can quit it at any time. The plan is worth trying because, after all, ERP is based on the hope that recipient nations will be exporting heavily by 1952. If a shooting war is avoided, Russia will be an important importer of these exports.

* * *

STEEL FOR WAREHOUSES: Much interest will be manifested in the meeting of warehouse representatives, who will go to Washington Apr. 21 in response to an invitation by Secretary of Commerce Harriman. The object of the conference is to discuss the problems, aims, and procedures of the Office of Industry Co-operation.

This means that the present system of voluntary allocations will be examined in the light of its possible application to the distribution of steel through warehouses. In 1946 steel handled through warehouses totaled 9,304,817 tons, or 19.1 per cent of total mill shipments. In 1947 warehouse receipts were 10,448,000 tons, or 16.5 per cent. The question facing several hundred thousand steel warehouse customers is this: In view of increased demands for priority steel for national defense and ERP, will I fare better in the next year or two by relying upon the warehouses as in the past or by taking a chance on the steel I will get under voluntary allocations?

Apparently there is a difference of opinion

(OVER)

among small businessmen as to the correct answer. A minority, who have been unfortunate in obtaining steel and who have had to resort to gray market supplies, are inclined to try anything on the assumption that nothing can be worse than what they have experienced in the past. The majority, however, with an understandable aversion to allocations by federal directives, will want to explore every other possible means of distributing steel equitably before resorting to any form of federal allocation.

Of course, this discussion can become purely academic if conditions grow acute enough to warrant mandatory allocations, along with many other federal restrictions. —p .43

* * *

NEW MILITARY WORK: At this stage nobody knows exactly what the military demands for steel will be in 1948. However, it is almost a foregone conclusion that steel ingot output cannot exceed 90 million tons, even under the most favorable circumstances. The limiting factor is not capacity; it is the supply of suitable iron ore, pig iron and scrap. Also the coal strike is a serious factor.

As to the need for steel for a sharp step-up in armament manufacture, experts point out that we will not face many of the tonnage-consuming projects that were important at the beginning of World War II. We will not have to build thousands of plants. Equipment needs will not be as great. Fewer ships will be built.

On the other hand, there will be new military work of a kind not known when we prepared for the last war. Whatever lies ahead in our preparedness program likely will tax industry in new and unforeseen ways. —p. 46

* * *

PIPE FOR IRRIGATION: A Department of Interior report recommends a sprinkler irrigation project that would deliver Columbia River water to an orchard and specialty-crop area in Oregon. If approved, this would be the first sprinkler irrigation undertaking in federal reclamation history. It provides for delivering the water by an electrically operated pumping system to the site to be irrigated through 141,000 feet of steel pipe of varying diameter. The water would be stored in an equalizing reservoir, from which it would be piped to individual consumers, who would purchase their own sprinkling equipment.

Pipe manufacturers right now may be too busy to give much immediate attention to new markets, but it is quite likely that at some time in the future, the distribution of irrigation water by pipe instead of flume or canal and its application to the soil by means of sprinkling systems may provide an attractive outlet for tubular goods. —p. 52

* * *

STEEL PRICE MODEST: Statistics compiled by the Bureau of Labor Statistics for the joint Congressional Committee on Housing provide a partial explanation of why home building costs are sky-high.

According to these figures, manufacturers' prices of all building materials increased 107 per cent in the period from August, 1939, to October, 1947. The increases of individual materials were as follows: Brick and tile, 61 per cent; cement, 32; lumber, 222; paint and paint materials 97; plumbing and heating supplies, 72; structural steel, 33; and other building materials, 70 per cent. During the same period, average hourly earnings on private building construction increased 88 per cent.

Lumber stands out as the material farthest out of line on the high side and cement and structural steel are noteworthy because of the relatively small percentages of their increases. In relation to the prices of most building materials, the prices of structural steel have been lower since 1941 than they were during extended periods throughout the past three decades. —p. 52

* * *

CONCENTRATED POWER: Seldom do the principal industrial barometers exhibit such mixed trends as at the present time. While the sharp cut-back in coal production occurred several weeks ago, its effect has been slow to register on some barometers. For instance, automobile output in March is estimated at 509,700 vehicles, a new postwar record.

Nevertheless, automobile production in the latest week is off sharply, probably ushering in a period of curtailed activity. Railroad car loadings and electric power output are tending downward sharply. Steel ingot output is due for a bad slump.

All of this is because we permit too much power to be concentrated in one man. —p. 62

E. L. Shaner

EDITOR-IN-CHIEF

East Engin. Lib.
Mahr

News Summary

PREPAREDNESS— First evidence of the expanding military preparedness program is showing up in the metalworking industries (p. 46). Alloy steel demand and production are higher. Aircraft plants are becoming more active and their suppliers are anticipating new orders, in many cases the first since the war. The armed services are starting to check industrial plants to see what they can produce and how soon. Real impact of the program will not be felt for some weeks or months, but metalworking executives are advised to take military requirements into consideration in their future planning.

EXPORTS— Shipments of potential war equipment to Russia and satellites will be sharply restricted under this country's revised export policy (p. 53), but considerable trade with the Soviet Union still will be permitted. Just where the line between war equipment and non-war material will be drawn remains to be decided.

COAL— To the end of last week, the "unwillingness" of John L. Lewis' coal miners to work had cost the country about 32 million tons of coal and 180,000 tons of steel (p. 48). Unless coal shipments to the steel mills are resumed quickly the reduction in steelmaking operations will be sharp. Mills to date have been holding production as near capacity as possible, gambling on an early settlement, but stocks of coal are dwindling to dangerously low levels.

WAREHOUSE ALLOCATIONS— Representatives of steel warehouse distributors have been invited to Washington to confer with Department of Commerce officials on participation in the voluntary allocations program (p. 43). Apparent aim of the move is to ease the possible curtailment in steel supplies to small business that might result from increased allocations to the freight car, oil industry and other socalled essential programs. Many steel distributors question whether a beneficial program can be worked out.

BUILDING MATERIALS—Prices of structural steel have advanced much less than those of most other building materials, according to a recent survey by the Bureau of Labor Statistics (p. 50). Using 1926 as a base, the index for structural steel has advanced only 43 per cent, compared with 87.5 per cent for all materials, and 195.6 per cent for lumber. Only cement and plumbing and heating materials have gone up less than structural steel.

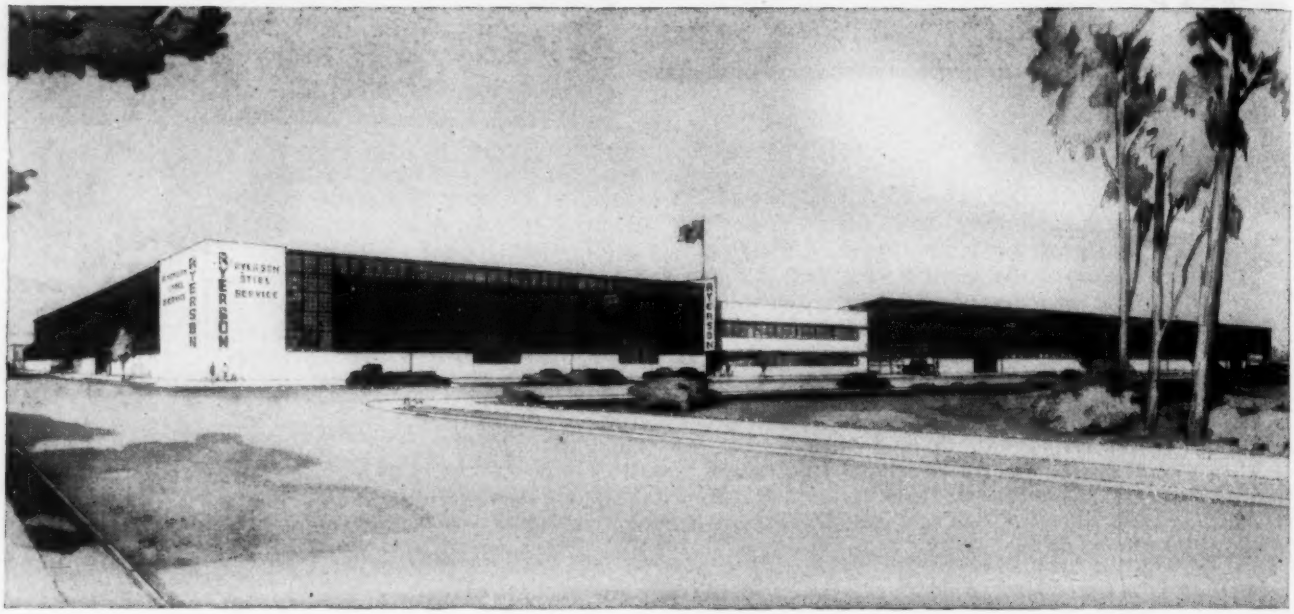
MORE INTERCHANGEABILITY?— The unitized body and frame construction pioneered by Lincoln is being abandoned in 1949 models. This has surprised many people in Detroit, especially as such construction recently has been adopted by other car manufacturers. A possible explanation offered (p. 57) is that Ford will seek greater interchangeability of parts among its three lines, with consequent production economies.

OIL NEEDS GAIN—Western oil industry's needs for pipe and other steel products are increasing because of the widespread boom in oil exploration (p. 49). Oil companies have scant inventories of steel, which is a limiting factor in their search for more oil.

ALUMINUM STRUCTURE— Wall panels, doors and window sash in the Aluminum Co. of America's new rolling mill at Davenport, Iowa, are all aluminum. More than 6,250,000 pounds of the light metal were used, representing, according to Alcoa, the largest single application in the building trades (p. 60). Even the 25,000 tons of structural steel used in the framework is covered by more than three carloads of aluminum paint.

SIGNS OF THE TIMES— Industrial production dropped five points in STEEL's index in the second week of the coal mine walkout (p. 62). . . . A new feature in STEEL (p. 49) lists production and shipment figures for various metalworking products. . . . Steel wage negotiations open this week in Pittsburgh (p. 48). Steelworkers are arguing for a "substantial" increase, the exact amount of which will be developed during the negotiations. . . . Scrap has taken the place of fuel as the No. 1 worry of the British steel industry (p. 54). A number of furnaces have been shut down due to the shortage of metallics.

Engineering News, P. 71 *Market Summary, P. 137*



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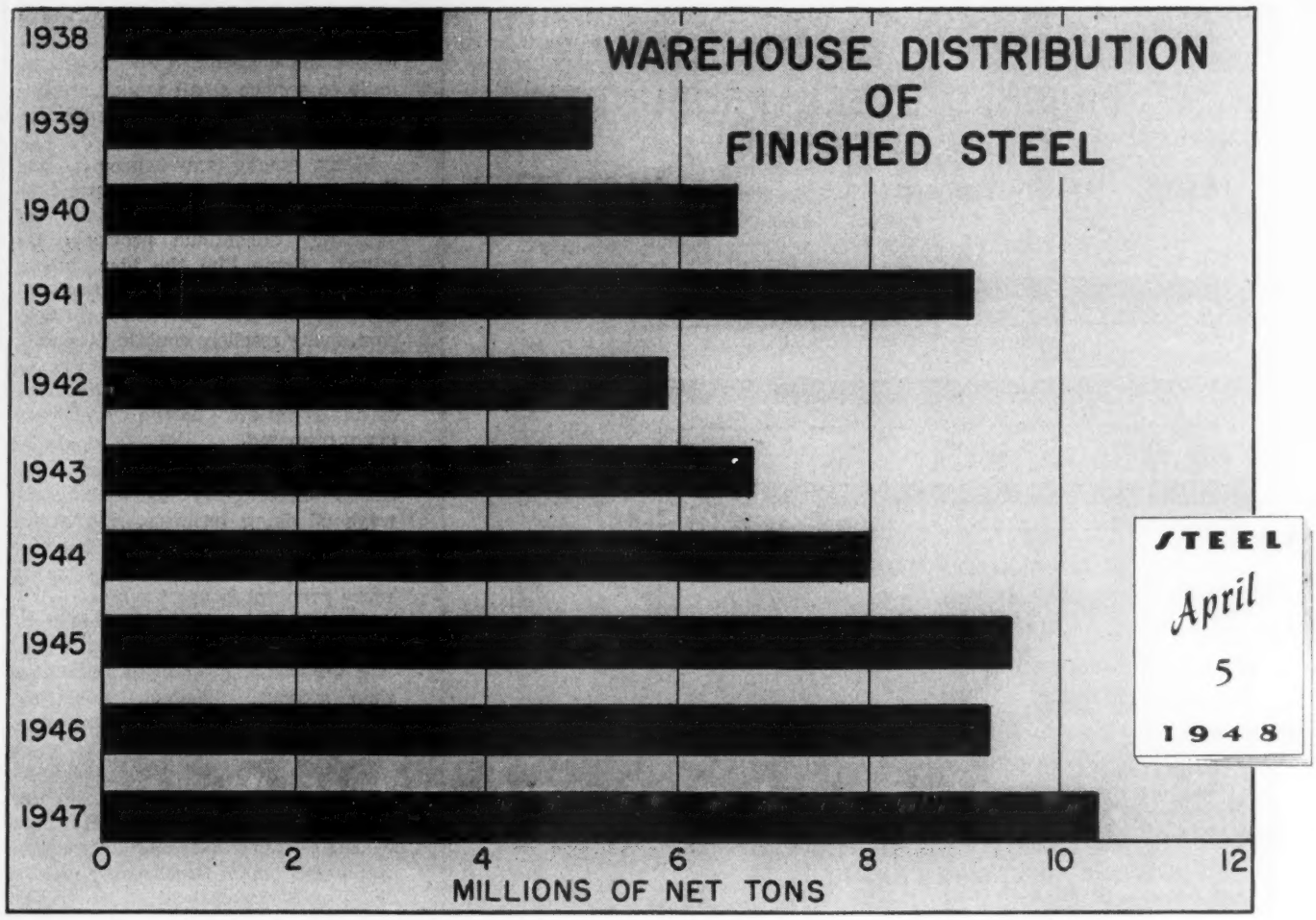


Warehouse Aid Sought In Steel Supply Pinch

Meeting with OIC called to explore possibility of co-ordinating distributors' function with voluntary allocations program, at same time increasing procurement assistance to small steel buyers

STEEL supply problem of small manufacturing industry continues one of the most pressing for solution before the nation.

Despite extensive congressional investigations, probing the subject from every conceivable angle, procurement difficulties of small business persist. Meanwhile, the "gray" market continues to thrive on the desperation buying of manufacturers facing operations curtailment because of inadequate supplies of metal.

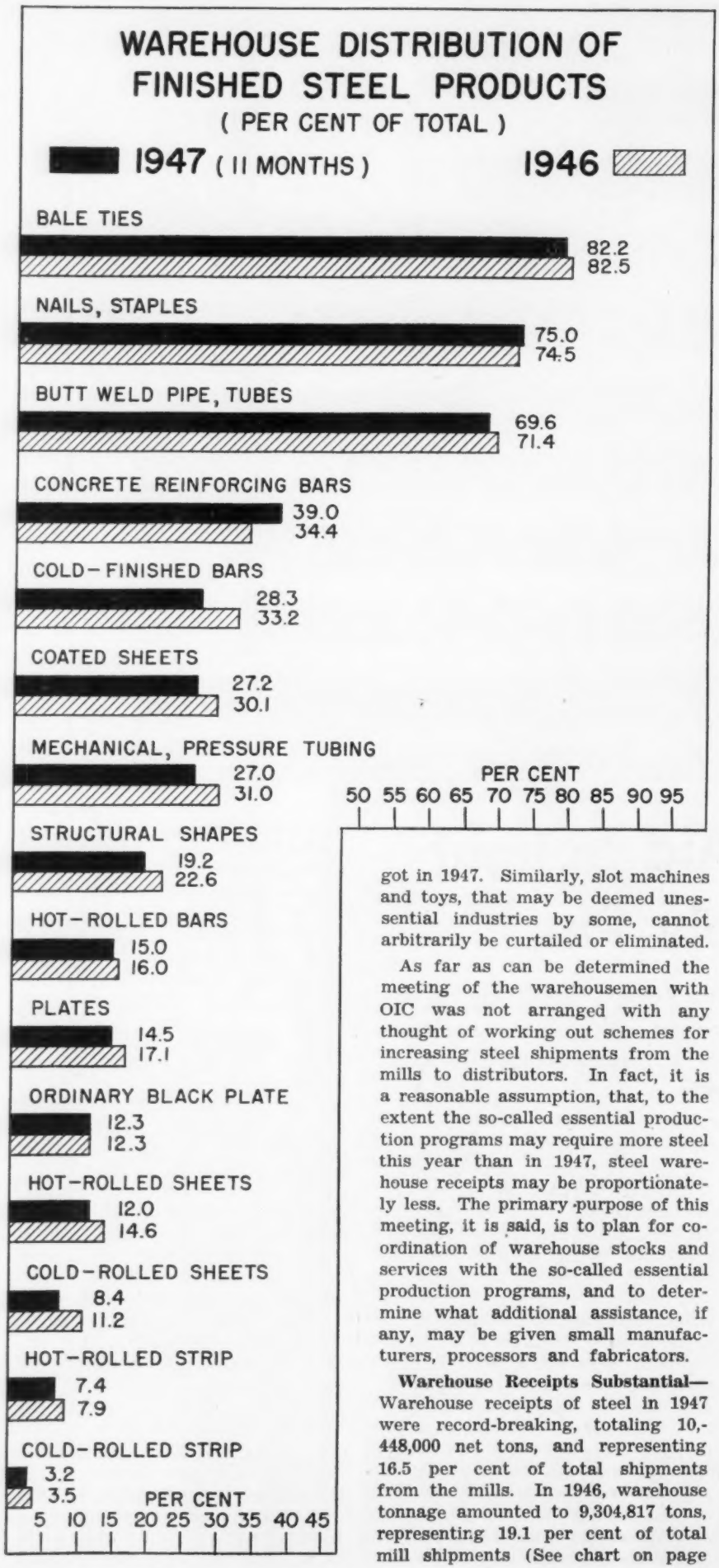
Short of an increase in production, which is unlikely, or a falling off in overall consumption, which seems equally unlikely in view of prospective enlargement of national defense requirements, the problem appears impossible of solution. There just isn't enough steel to satisfy all of the needs of industry, large or small.

Press for Solution—In the face of discouragement, however, governmental agencies continue to press for a solution of the problem. This is especially noticeable whenever a vote-conscious congressman lets out a bleat that something be done. Right away, it seems, someone in Washington flaps his wings more vigorously than ever, and with the resulting gust of wind comes a new suggestion. The latest of these aims at bringing the steel warehouse industry into the voluntary allocations program as a possible means of easing the blow to small business resulting from any curtailment of steel supply due to increased allocations to so-called essential programs.

Last week Secretary of Commerce Harriman invited representatives of steel warehouse distributors to Washington Apr. 21 for an industry meeting to discuss the problems, objectives, and procedures of the Office of Industry Co-operation which is directing the voluntary allocations program.

The importance of serving small business with steel from warehouse stocks will be stressed at this meeting and the warehousemen will be asked for suggestions for co-ordinating warehouse facilities with other steel industry resources in accelerating programs to alleviate shortages of railroad freight cars, low-cost housing units, food, oil and gas.

Ask $64 Question—Warehousemen are in agreement that steel for these essential programs should be made available. However, they ask a $64 question: "If additional steel is supplied for these programs, from whom is it to be taken and in what proportions?" The law providing for voluntary allocations, it is pointed out, does not clothe either industry committees or the Department of Commerce with legal authority to say that the motor car industry or stove manufacturers shall get only 90 or 75 per cent as much steel as they



got in 1947. Similarly, slot machines and toys, that may be deemed unessential industries by some, cannot arbitrarily be curtailed or eliminated.

As far as can be determined the meeting of the warehousemen with OIC was not arranged with any thought of working out schemes for increasing steel shipments from the mills to distributors. In fact, it is a reasonable assumption, that, to the extent the so-called essential production programs may require more steel this year than in 1947, steel warehouse receipts may be proportionately less. The primary purpose of this meeting, it is said, is to plan for coordination of warehouse stocks and services with the so-called essential production programs, and to determine what additional assistance, if any, may be given small manufacturers, processors and fabricators.

Warehouse Receipts Substantial—Warehouse receipts of steel in 1947 were record-breaking, totaling 10,448,000 net tons, and representing 16.5 per cent of total shipments from the mills. In 1946, warehouse tonnage amounted to 9,304,817 tons, representing 19.1 per cent of total mill shipments (See chart on page 43). The heavy shipments to the warehouses since the end of the war reflect the determined efforts of the mills to service small manufacturing industry to the fullest possible extent.

Views among warehousemen and their customers with respect to bringing the distributors into the voluntary allocations program are mixed. Some like the idea, others do not. The suggestion has been received by some with little enthusiasm, many resellers doubting the step would prove advantageous for small consumers, especially since allocation of additional steel to the warehouses is not proposed.

As a general thing, because allocation is contrary to time-tested ways of doing business, and interferes with normal relationships between supply and demand, the warehouse proposal is not favored. Wartime experience, it is said, demontrated the virtual impossibility of setting up workable controls on materials without, in effect, regulating end-product production schedules. While small steel consumers would like to receive more steel, the general view expressed is that if the warehouse allocation plan were to involve priority certificates and considerable red tape they would prefer to take their chances with things simply as they are.

Depend on Gray Market—Most small steel buyers are of the opinion that unless larger steel tonnages are made available to the warehouses they will have to depend to some extent upon the "gray" market for their supplies. This, they say, will be increasingly so in event railroad car and oil industry allocations cut down warehouse receipts, not to say anything about possible increases in demand for new national defense programs.

As a general thing, reports that the "gray" market is falling apart are discounted. As reported in STEEL (Mar. 1, p. 62), growing resistance to the high prices quoted in this market has been in evidence in recent weeks but still a large volume of metal continues to be sold at premium prices. Tom J. Smith Jr., president, Pressed Metal Institute, in a letter to members says there is, as yet, no positive evidence of a fading "gray" market or ingot conversion recession. He points to high priced offerings of waste wasters, and imported steel from Belgium and England to support his position.

Last week, the House subcommittee to investigate questionable trade practices held hearings inquiring into conditions in the sheet steel market which were described as "start-

ling." Congressman W. Kingsland Macy (R., N. Y.), chairman of the committee, said investigations had disclosed that because of the steel shortage, sheet steel and certain other products have attained a bargaining position out of all proportions to their ordinary intrinsic value.

Questionable Practices—"We have found in many cases," said Congressman Macy, "that this has given rise to questionable trade practices highly profitable to those on the inside, but extremely costly to the people who buy stoves, refrigerators, and other similar household items."

Three transactions which typify various methods by which steel is channeled into the "gray" market were selected for study. The same mill, according to Macy, is involved in each instance.

The particular operations which the committee inquired into are as follows: 1—A scrap dealer obtains sheet from the mill in return for scrap. He resells these sheets in the "gray" market at prices ranging as high as three times the mill price.

2—In order to induce a purchaser to buy certain inventory, an automobile manufacturer uses his standing with a mill to obtain sheet steel for the said purchaser. The mill price for this steel is approximately $107 a ton. However, the purchaser resells the steel and after passing through the hands of four other brokers it eventually gets to a manufacturer who has to pay $320 a ton for it.

3—A radio manufacturer disposes of his inventory on a "tie-in" basis with sheet steel from a mill which he owns. In order to obtain 18,000 tons of this steel, operators normally engaged in far different pursuits, agree to purchase 28,000 radios overvalued by the manufacturer by more than $1 million. However, the operators are willing to take this initial loss, since they know this venture into the "gray" market will give them a net profit of approximately $1,250,000.

Republic To Extend Use Of New Blowing Method

Republic Steel Corp., Cleveland, will extend the use of its recently developed high top pressure blast furnace blowing technique to five additional furnaces this year, E. M. Richards, vice president in charge of operations, announced recently.

Installations will be made at furnaces in Warren, O., Buffalo, South Chicago, Ill., and at two additional Youngstown facilities. New blowing equipment will be installed at Buffalo and Warren, but the other furnaces will use their present blowing machinery. When the installations are completed, increased pig iron capacity will be nearly the same as if an additional furnace had been built.

In this new technique greater than normal volumes of air are blown into the bottom of a blast furnace while a throttle valve at the top restricts escape of the waste gases, thus building up gas pressure within the furnace, and reducing the velocity at which the gas passes through the furnace.

The most important installation will be at Warren where a turbo-blower will be installed. This blower, now under construction by Ingersoll-Rand Co., will provide 125,000 cu ft of air per minute at 40 pounds pressure. When adaptations are completed, production is expected to exceed 1600 tons of iron per day, 25 per cent above the current rated capacity.

New Tool Shipments Up, Orders Down in February

Machine tool shipments, which dropped in January to the lowest level since last summer when many builders' plants were closed for vacations, moved upward in February to slightly above last year's average. February's volume of new orders likewise was in excess of last year's average, but was below the January volume, according to the National Machine Tool Builders' Association.

The following table shows the association's newly established index for shipments, orders, cancellations and order backlogs for February, January and for 1947 by months.

(1939 Shipments = 100)

1947	New Orders (gross)	Cancellations	Shipments	Order Backlog
Jan. ...	128.5	10.0	164.3	1,059.0
Feb. ...	112.4	11.9	163.9	986.4
Mar. ...	131.0	9.6	178.2	926.8
Apr. ...	122.6	12.2	165.3	871.6
May ...	134.7	33.2	156.3	820.1
June ...	161.3	16.4	148.5	818.9
July ...	145.1	8.5	114.3	837.6
Aug. ...	108.4	6.6	111.5	828.0
Sept. ...	110.6	7.8	134.5	798.4
Oct. ...	142.1	7.2	167.4	768.5
Nov. ...	133.8	7.4	147.3	748.3
Dec. ...	142.3	6.5	173.1	711.3
Ave. ...	131.1	11.4	152.0	847.9
1948				
Jan. ...	146.3	6.1	132.9	715.6
Feb. ...	134.9	7.9	153.1	689.3

Present, Past and Pending

■ CARPENTER STEEL OFFICIALS PROMOTED

READING, PA.—J. H. Parker, president, Carpenter Steel Co., has been elected chairman of the board; F. R. Palmer, vice president, has been named president; and R. V. Mann, general sales manager, has been chosen vice president in charge of sales.

■ FURTHER MINE MECHANIZATION SOUGHT

PITTSBURGH—A two-year program to design a machine for faster and cheaper coal production was launched last week by the bituminous coal industry. Objective is a machine to cut coal off the solid without using explosives and load it into mine cars or onto conveyors.

■ GENERAL MILLS TO MAKE TOASTERS, FOOD MIXERS

CHICAGO—Automatic toasters and food mixers are under development at General Mills Inc. and will be ready to go on the production line soon. Tooling for the toasters probably will be completed late this summer.

■ REYNOLDS METALS TO PRODUCE ALUMINUM IN CHINA

RICHMOND, VA.—The Chinese National Government has approved a contract with Reynolds Metals Co. to operate an aluminum industry in China on a partnership basis.

■ KOPPERS TO BUILD PLANT FOR SYNTHETIC FUELS

PITTSBURGH—Koppers Co. Inc. has begun engineering work on a $4½ million government demonstration plant at Louisiana, Mo., for production of synthetic liquid fuels, and construction probably will start in three months.

■ BRITAIN TAKES OVER ELECTRIC UTILITY INDUSTRY

LONDON—Great Britain took ownership last week of all the country's electric utilities, sixth major enterprise to be nationalized under the Labor government's program. Stockholders in private companies will be paid in treasury guaranteed British electricity stock.

■ PROMINENT EXECUTIVE OF FORD MOTOR CO. DIES

BAY CITY, MICH.—Russell H. McCarroll, 58, director of chemical engineering and metallurgical research for Ford Motor Co., died Mar. 31.

Industry Sizing Up New Military Program

Impact of preparedness drive not expected to be felt until third quarter, although instances of increased activity are reported in alloy steel and aircraft procurement

METALWORKING executives are giving sober consideration to the implications of an expanding military preparedness program. Although the new procurement plans generally have not yet emerged from the preliminary planning stage, a few instances of increased activity in lines closely associated with war materiel are noted. Chiefly these are increased alloy steel output and reactivation of aircraft manufacturing facilities.

That the impact of the military program will be felt throughout the industry within the next few months is accepted. The increases in materiel procurement, it is believed, will be much greater than indicated by the administration in official utterances to date. For example, the administration has been talking about an increase of $3 to $4 billion to the $11 billion military program already authorized. At the same time, Washington insiders concerned with formulating the program are talking about a $20 to $21 billion program for the next fiscal year. Should the international situation worsen, these estimates may be quickly and sharply increased.

Plants Surveyed—Some companies report they have been approached by military procurement officials with feelers as to what they could produce and how soon. Inquiries have been circulated for shell steel. Orders have been placed for high grade electric steel for aircraft engines. At least one major aircraft plant is being readied for production and will be operated by the Army. Wartime suppliers of aircraft parts and components are reviewing their present operations in anticipation of large new aircraft orders.

The Munitions Board announces that representatives of the armed services are starting to contact some 11,000 industrial plants to discuss production capacity at specific plants. They want to know what the plants can produce in the way of products for war, and how much. Other production problems will be discussed by the plant management and representatives of the Army, Navy and Air Force. One aim of this survey will be to avoid competition among the services for the output of the specific plants.

Preparedness Favored—Industrialists generally are in accord with the military's program of preparedness, although many would like to see a clearer determination of national policy. This attitude was pointed up last week before the Senate Armed Services Committee by Bernard M. Baruch who said this country should make up its mind where it stands and back up its stand with "a total plan for industrial and economic mobilization."

Such a mobilization plan, said Mr. Baruch, should contain a blueprint for priorities, allocations and rationing powers, ceilings over prices and wages, taxation to drain the profits from war, a work-or-fight wartime draft and the organization of pools of labor, professions and sciences, stockpiling of strategic materials, retention of war plants in stand-by readiness, decentralization of industry, up-to-date surveys of underground industrial facilities and uniform war contracts.

Similar views were expressed before the senators by C. E. Wilson, president of General Electric Co., and former vice chairman of the War Production Board.

May Cut Civilian Supply—Steel and metalworking people expect the enlarged military program in conjunction with the Marshall Plan will cut rather sharply into supplies of steel and other critical materals for civilian consumption in the third and fourth quarters this year. One steel company is considering setting up a separate quota for military use, and, of course, all companies stand ready to supply whatever material may be needed for the armament program.

This increase in requirements for foreign aid and domestic military production, superimposed on a civilian demand which has been exceeding supply, brings the question of mandatory allocations and controls closer to the front. This will continue a controversial subject for some time to come, with the administration pressing for the mandatory controls and industry probably insisting that they are not necessary unless the military program assumes much greater proportions than now projected.

Survey Potentials—Wherever metalworking men meet, thought is being given to implications of the military program and especially what it will mean in iron, steel and nonferrous

DISCUSS PREPAREDNESS PLANS: Members of the Senate Armed Services Committee gather around Secretary of State Marshall and Defense Secretary Forrestal to talk over plans for raising this country's military strength. Left to right, front row: Sen. Chan Gurney (Rep., S. Dak.), chairman; Mr. Forrestal and Mr. Marshall. Back row: Sen. Burnet Maybank (Dem., S. C.); Sen. Richard Russell (Dem., Ga.); Sen. Harry Byrd (Dem., Va.); Sen. Leverett Saltonstall (Rep., Mass.); Sen. Lister Hill (Dem., Ala.); Sen. Styles Bridges (Rep., N. H.); and Sen. A. Willis Robertson (Dem., Va.). NEA photo

metals. The consensus is something like this:

Steel production this year can hardly be more than 90 million tons, even should the coal strike be quickly resolved and no other serious work stoppages occur. The ceiling is set not by lack of steel capacity but by the availability of raw materials, with iron ore a critical factor as well as scrap and pig iron. To obtain ore to produce 90 million tons of steel, or 4 million tons under capacity, would require the development of marginal ore properties and additional shipping and terminal facilities for the handling of ore. Such developments would require some months and hardly could contribute to this year's production.

Steel mills are having difficulties in obtaining enough scrap to maintain production at a rate of 88 million tons a year (before the coal strike).

Demand Less than in World War II —Steel officials, however, believe the requirements for steel in the new military program should be substantially less than at the beginning of World War II. Need for plant expansion will not be as great, due to the availability of plants built since 1940. Ships will not be needed in such great numbers. The military is believed to have enormous supplies of guns and artillery and shell.

Demand for new aircraft undoubtedly will be large and in fact will comprise the bulk of the armament program as now projected. Heavy demands for new types of ships, especially tankers and transports, would arise if hostilities appeared imminent. And, for that matter, all types of material may be expected to rise sharply in demand. But the shock of meeting military demands should not be as severe as at the start of the last war.

Some speculation as to the probability of building huge underground defense facilities, requiring fabulous tonnages of steel, is heard, but little is definitely known as to any plans for these.

Civilian Demand Approaching Balance — Supply of civilian goods is believed to be in better shape now than at the outbreak of World War II, with certain exceptions, notably automobiles. Prior to the war, the country was coming out of a long depression, with a heavy accumulation of domestic needs. Now with about two and a half years of record production in most civilian goods, domestic needs are fairly well taken care of. Another year or two of peak production would be required to sat-

(*Please turn to Page* 156)

Screw Machine Group Meets

National association marks 15th anniversary at Chicago convention. Labor relations, technical discussions featured. Robert Chestnut elected president

NATIONAL Screw Machine Products Association, Cleveland, celebrated its fifteenth anniversary last week with its 1948 annual meeting Mar. 31 through Apr. 3 at the Drake Hotel, Chicago.

Featured at the convention was an industrial relations session with Orrin D. Gray, chairman, National Industrial Relations Committee, presiding. Mr. Gray reported on a program for member companies. Other speakers included Roy Bell, regional manager, National Association of Foremen, whose topic was "The Foreman, Yesterday-Today-Tomorrow," and T. H. Schaffer, Joslyn Mfg. & Supply Co., who reviewed "A Combined Incentive, Profit-sharing and Retirement Plan That Works."

Public Relations—At the business, legislative and public relations session, Oliver F. Fancey, industry consultant, Washington, spoke on "Washington—If the Democrats are Re-elected." Richard E. LaFerte, Research Institute of America, gave an introduction to the movie, "Crossroads of America," which dealt with Communists in action.

The technical session was highlighted by discussions of first aid requirements for small and medium sized plants; the new dry seal thread in industry; standard bar stock identification by color; modern developments in second operation; and industrial lighting.

Elect Officers — Officers elected were: President, Robert Chestnut, Aluminum Co. of America, Edgewater, N. J.; vice president, Charles D. Hoyt Jr., Charles D. Hoyt Co., Mishawaka, Ind.; treasurer, William N. Grass, M. J. Grass Screw Machine Products Co., Buffalo.

Directors elected were: E. H. Baker Jr., Locke Machine Co., Cleveland; James P. Baldwin, Corbin Screw Division, American Hardware Corp., New Britain, Conn.; Kenneth Biddle, Biddle Screw Products Co., Sheridan, Ind.; J. S. Elsby, Screw Machine Products Co., Milwaukee; R. A. Galorneau, Central Screw Products Co., Detroit; Orrin D. Gray, Machinery Products Corp., Chicago; Walter A. Heimsch, Dayton Appliance Co., Dayton, O.; Charles H. Hyde, David Bell Co. Inc., Buffalo; Robert C. LeMay, Waterville Mfg. Co., Waterville, Conn.; Rollin J. Lobaugh, Pacific Screw Products Co., San Francisco; C. E. Lucas, Lucas Screw Products Inc., Rochester, N. Y.; Eric Nord, U. S. Automatic Corp., Amherst, O.; Stanley Redmer, Redmer Sons Co., Chicago; Camiel Thorrez, Thorrez & Maes Mfg. Co., Jackson, Mich.; Daniel F. Viles, Waltham Screw Co., Waltham, Mass.; Roy V. Woodworth, Progressive Service Co., St. Louis.

Orrin B. Werntz, manager of the association for the past 11 years, was re-elected executive secretary.

Warehouse Convention Plans Completed

Labor relations, the economic situation and specific steel warehouse industry problems will be among the subjects discussed at the 39th annual meeting of the American Steel Warehouse Association at the Drake Hotel, Chicago, May 10-12.

Speakers will include Cyrus S. Ching, chairman, Federal Mediation & Conciliation Service, who will discuss current labor problems; James D. Mooney, chairman and president, Willys-Overland Motors Inc., who will discuss the nation's fiscal policy in its relation to gold, to world prices, to free markets and to the economic future; and David F. Austin, vice president, U. S. Steel Corp., who is a member of the Steel Industry Advisory Committee of the Office of Industry Co-operation.

Other speakers include Walter S. Doxsey, president of the association, Edward A. McFaul, School of Commerce, Northwestern University, Dr. George S. Benson, president, Harding College, Searcy, Ark.

Reinforcing Steel Group To Meet Apr. 19-24

Concrete Reinforcing Steel Institute, Chicago, will hold its twenty-fourth annual meeting at the Edgewater Gulf Hotel, Edgewater Park, Miss., Apr. 19-24.

In conjunction with the annual meeting will be meetings of the Wire Reinforcement Institute, the Steel Joist Institute and the Committee on Reinforced Concrete Research of the American Iron & Steel Institute.

Steelmaking Cutback Moderate

Drastic reductions to come soon unless coal shipments are resumed. Loss to date exceeds 32 million tons of coal, 180,000 tons of steel ingots

STEELMAKING operations slumped only moderately last week, the third of the soft coal walkout, to 88-1/2 per cent of capacity, down 4-1/2 points from the preceding week. Steel producers have been keeping operations as high as possible and gambling on an early settlement of the miners' dispute.

Unless coal starts flowing to the mills this week much sharper reductions in blast furnace and steel mill operations will be made. These are expected to hit hardest in the Pittsburgh, Youngstown, the South, West and some eastern districts. Coal stocks at week's end had dwindled to a point where drastic cutbacks could no longer be delayed.

To the end of last week, the miners' "unwillingness" to work had caused an estimated loss of 32 to 33 million tons of coal production. Actual loss in steel ingot output was between 180,000 and 200,000 tons (a 1 point drop in steelmaking operations means a loss of slightly more than 18,000 tons a week). This figure does not take into account further losses that will be due to delays in getting facilities back into production after coal shipments are resumed.

Foundries Affected—One effect of the coal mine idleness has been to intensify the shortage of pig iron and coke for foundries. A number of blast furnaces producing merchant iron have been banked. Coke output has been cut back sharply by a number of producers and others are using stockpiled coal for coking, resulting at times in an inferior grade of coke.

Rail transportation has been restricted where coal burning locomotives are used. The Interstate Commerce Commission ordered a reduction of 25 per cent in such freight haulage, but exempted roads carrying iron ore to the upper lake ports.

Utility companies have not yet been affected by the coal stoppage. At the beginning of March the utilities had an average of 60 days' coal supply at the February rate of consumption.

Fact-Finding Board Reports—President Truman's fact-finding board submitted its report to the Chief Executive last Wednesday, but the White House chose not to release the report immediately. The board had made little progress in its attempts to examine John L. Lewis, the mine union chief. The latter had refused to appear before the board until ordered to do so by a federal court.

Under the "national emergency" provisions of the Taft-Hartley Act, the following steps appeared probable at week's end:

1. The attorney general would obtain an injunction against the work stoppage.

2. The fact-finding board, after 60 additional days, would again report to the President on the current situation.

3. The miners would be polled, within 15 days after the second fact-finding report, on how they feel about the negotiations between the union and the operators.

4. The injunction, within five additional days, would be dropped. If no settlement were reached before then, the stoppage could be resumed legally.

5. Finally, the President might submit the issue to Congress.

Lewis Tactics—Should an injunction against the mine stoppage be obtained by the government early in April and the foregoing Taft-Hartley procedure followed, the coal stoppage could become legal in 80 days or just before the miners' contract with the operators expires. Then, Lewis could submit his third round wage demands to the operators and back up his demands with the threat of a legal strike. Such a move would come at a critical time when coal stocks, depleted by the March walkout, would be low and at a time when the new military preparedness program possibly would be beginning to roll.

Coal fact-finding board members reported to the President on the mine stoppage last week, placing much of the blame on John L. Lewis. Members are shown above, left to right: Judge Sherman Minton of the seventh circuit court of appeals; George W. Taylor, former chairman, War Labor Board; Mark Ethridge, publisher, Louisville Courier-Journal

Steel Wage Demand Negotiations Open

Negotiations between the United Steelworkers of America-CIO and the basic steel producers over the union's demand for a substantial wage increase start today. Main show will be at Pittsburgh where the top union officials will open discussions with the United States Steel Corp.

Talks between the union and the nonbasic steel industry will be delayed until an agreement is reached with the basic steel industry. Many of the contracts with the nonbasic companies expire at later dates.

As the negotiations opened, the union had failed to spell out their wage demands in dollars and cents. They will argue for an increase on the ground of increased living costs and the industry's ability to pay.

The two-year contract signed a year ago provides that the contract can be reopened this month for wage negotiations only. If no agreement on the union's demands are reached by Apr. 30, the contract automatically continues for another year.

The two-year contract contains a no-strike agreement and President Philip Murray of the union has assured the industry that the steelworkers will not break the no-strike pledge.

Oil Industry Steel Needs Gain on Coast

CALIFORNIA'S oil industry, a major outlet for steel products, is beginning to worry over effects of the current coal strike on steel production. Large quantities of steel go into storage tanks, refinery buildings and equipment, distribution pipelines and drill pipe, to mention only a few major uses of steel in the huge oil industry.

The current supply problem is intensified by two factors. One is the fact that no oil company has been able to build a stockpile of drill pipe because of the steel shortages of the last seven or eight years. Drilling activities must be geared to the supply of pipe.

Demand Increases — Secondly, demand for drilling pipe is increasing sharply because of a widespread boom in oil exploration in California at present.

Another influencing factor is California's drought which is putting a great burden on steam generating plants. Oil is used as a fuel in most of these plants, and as the hydro-electric generators slow down, the drain on oil increases.

Reinstatement, Back Pay Ruled for Foremen

Recommendation that Carnegie-Illinois Steel Corp. be ordered to reinstate with back pay 82 foremen discharged for their refusal to work during the 1946 steel strike was made last week by Trial Examiner Charles E. Persons of the National Labor Relations Board.

The foremen, employed at Gary, Ind., were asked to act as a skeleton maintenance force during the 1946 strike but refused, in accordance with the policy of the local chapter of the Foremen's Association of America. The trial examiner held the foremen's actions during the strike were "manifestations of the freedom accorded free men concertedly to leave their employment" under the Wagner Act. The examiner dismissed a company contention that the case should be dismissed because the Labor Management Relations Act of 1947 no longer protects the rights of foremen to engage in union activities and held that the Wagner Act should apply.

Facts for Industry . . .

(Reported by the Bureau of the Census, Department of Commerce)

Forgings — Commercial steel forging shipments increased in January to 118,534 short tons from 116,798 in December. Drop and upset forgings accounted for 89,677 tons, press and open hammer forgings for 28,857 tons. Order backlogs were up 4 per cent to 618,155 short tons.

Tractors—Manufacturers' shipments of complete tractors and attachments and parts in 1947 totaled $719 million, increase of 60 per cent over the $450 million shipped in 1946. Value of tractors was $509 million and of attachments $210 million. Of the total of 625,657 complete tractors, 421,375 were wheel type, 166,864 garden type and 37,418 tracklaying type.

Farm Machines—Value of farm machines and equipment, including attachments and parts, amounted to $1,248 million in 1947, 50 per cent higher than 1946 value. Domestic shipments took 88 per cent of the total.

Trailer Coaches—Shipments of housing type trailer coaches in January totaled 4093 units, valued at $7,222,334, and 4309 units were produced.

Boilers—Thirty million lb of cast iron boilers and 5.4 million sq ft of cast iron radiators and convectors were produced in January, for respective increases of 5 per cent and 4 per cent over December production. Boiler shipments were down 20 per cent to 22.7 million lb, valued at $3.6 million. Radiator shipments were down from 5.4 million sq ft in December to 5.2 million sq ft. Value of January shipments was $2.5 million.

Water Systems—Three per cent more domestic water systems were shipped in January than in December, factory shipments aggregating 62,758 units valued at $4.7 million. Jet systems showed 5 per cent increase; nonjet systems, 2 per cent; hand and windmill pumps, 6 per cent; pump jacks, 27 per cent; cylinders, 24 per cent; windmill heads, 4 per cent; and windmill towers, 32 per cent.

Stokers—January's factory sales of mechanical stokers declined 2 per cent from the December total to 2669 units. Of the total 1897 were for residential use (other than apartment houses).

Castings — Shipments of gray iron castings, including soil and pressure pipe, totaled 1,064,335 short tons in January, compared with 1,066,211 in December. Shipments to the trade were 55 per cent of the total, 480,097 tons being produced for manufacturers' own use. Molds for heavy steel ingots accounted for 160,612 tons, chilled iron railroad car wheels for 55,605 tons, pressure pipe and fittings for 91,019 tons and soil pipe and fittings for 48,506 tons.

Stoves—Production of nonelectric cooking stoves and ranges increased 11 per cent above December in January, with 313,949 units turned out. January shipments totaled 288,199 units, valued at $22.1 million, compared to December shipments of 285,575 units worth $22.8 million. Gas ranges represented about two-thirds of the total.

Heating Stoves—Domestic heating stove production in January, at 415,262 units, was 29 per cent less than in December. Shipments declined to 316,502 units, valued at $7.6 million, compared with December shipments of 580,190 units with a value of $13.3 million.

Scales, Balances — Value of scales and balances (other than laboratory scales and balances) was $13.1 million during fourth quarter, 1947. This represented a 13 per cent increase over third quarter shipments.

Steel Boilers — January's new orders for steel boilers of 100 sq ft of heating surface and over totaled 1102 units with heating surface of 1.1 million sq ft. This compared with December bookings of 1276 boilers with heating surface of 1.4 million sq. ft. Of the January total 555, or 50 per cent, were stationary power boilers of over 15 lb pressure. Heating surface of these accounted for 73 per cent of the total.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Rehabilitation of power and transportation facilities, collieries, sugar, cement and fertilizer industries take top priority in Chinese economic aid program

CHINESE economic assistance plan recently handed to Congress by the State Department does not, as at first expected, contain provision for rehabilitating China's small iron and steel industry. It was explained, however, that "this listing of projects merely indicates the most urgent needs of China" and "determination of allocation of funds for individual projects will remain a matter for the determination of the administrator of the program."

One of the urgent projects, State Department reported, is rehabilitation of properties of the United Power Co., Shanghai; this company, the principal supplier of electrical current in Shanghai, is a Delaware corporation and a subsidiary of the American Foreign Power Co. This will take $14 million.

Another top project is the repair of South China's most important transportation outfit, the single-track Hankow - Canton - Kowloon Railroad. This will require $43 million.

Another urgent project is rehabilitation of the Anyuen and Kaokeng collieries in West Kiangse Province, to require $10 million United States money. Another $5 million is earmarked for reopening of coal mines in Hunan Province.

Other projects listed as "urgent" include rehabilitation of the sugar industry in Formosa, establishment of artificial fertilizer plants in Formosa and South China, expansion of cement manufacturing plants, improvement of port facilities, and "other industrial projects."

For carrying out the above projects, and otherwise providing economic assistance, the report calls for exporting 115,373 metric tons of rolled steel products and 17,588 metric tons of nonferrous metal products from the United States to China over the period Apr. 1, 1948, to June 30, 1949. These figures approximate our present exports to China.

As to steel: "Most important in volume and value are steel sheets and plates for ship and railroad repair; angles, girders, reinforcing bars, etc., for construction and repair purposes (bridge repair is of special importance); rails, and bars and plates used chiefly for processing into hand tools. The amounts in each category are small, but continuance of these imports is vital to the maintenance of economic activity in China."

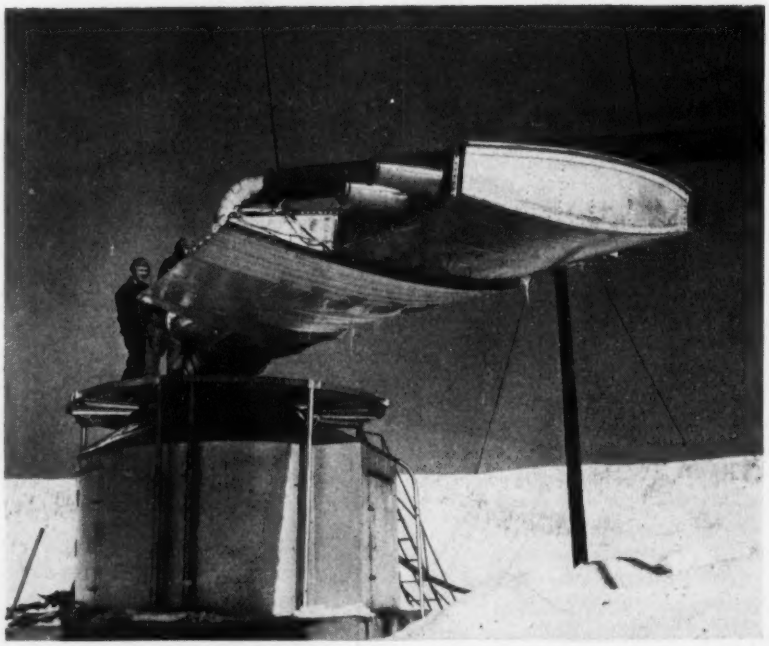
Building Materials Prices

Relationship of structural steel costs to costs of other building materials has shifted radically over the past 35 years. In 1913 the consumer paid much more for structural steel compared with other building materials than he does today. The cost of structural steel has advanced less than any other building material except cement and plumbing and heating.

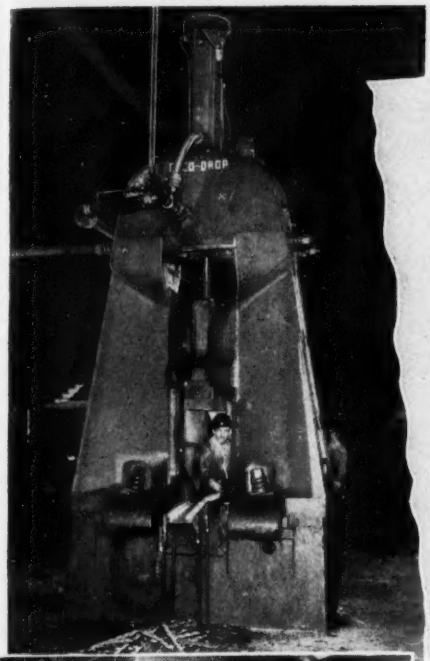
That is one of the striking facts to be gleaned from a table specially prepared by the Bureau of Labor Statistics for the Joint Congressional Committee on Housing, and included in Part 2 of the committee's final majority report on information uncovered during its year-long investigation of the national housing problem. Part 2 is entitled "Statistics on Housing," and the contents of its 325 pages are a veritable handbook of every kind of information, seemingly, of interest to anyone engaged in any sector of the housing industry.

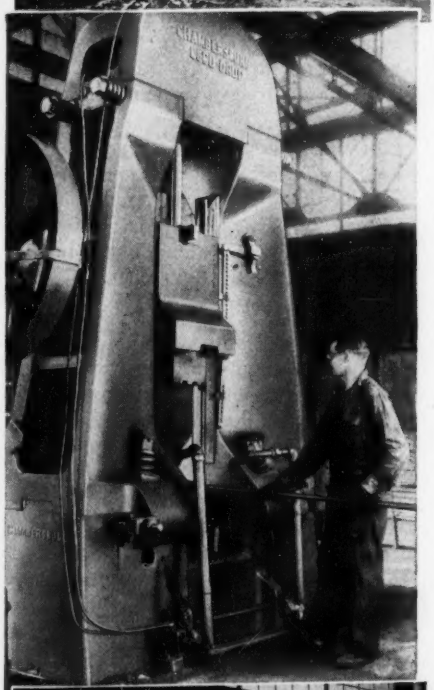
In general, it presents facts and figures to indicate the size and scope of the housing market. For example, it sets forth censuses of the installations of plumbing equipment, central heating systems, cooking facilities, etc., in the country's homes. It has the usual statistics on marriages and family formations, average number of occupants per housing unit, etc. It has a vast amount of data on the financing of homes, both in their erection and their purchase. It also has a lot of information about prices and costs and profits in the building field, as well as figures denoting production and consumption of the different building materials.

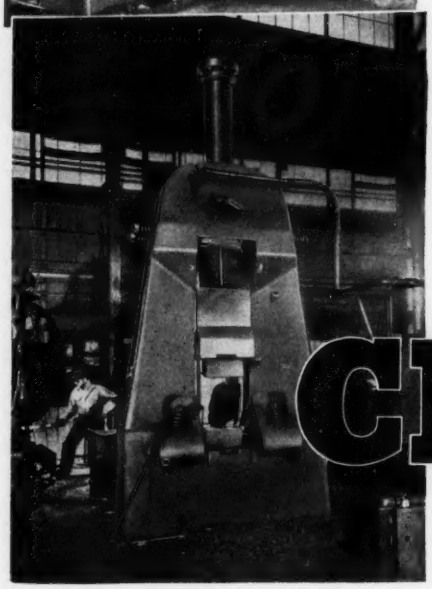
Of the 154 tables in the book, perhaps the most interesting to manufacturers will be those showing the indexes of wholesale prices of building materials over the years and the increases in prices and wages since 1939. In the first it will be noted the

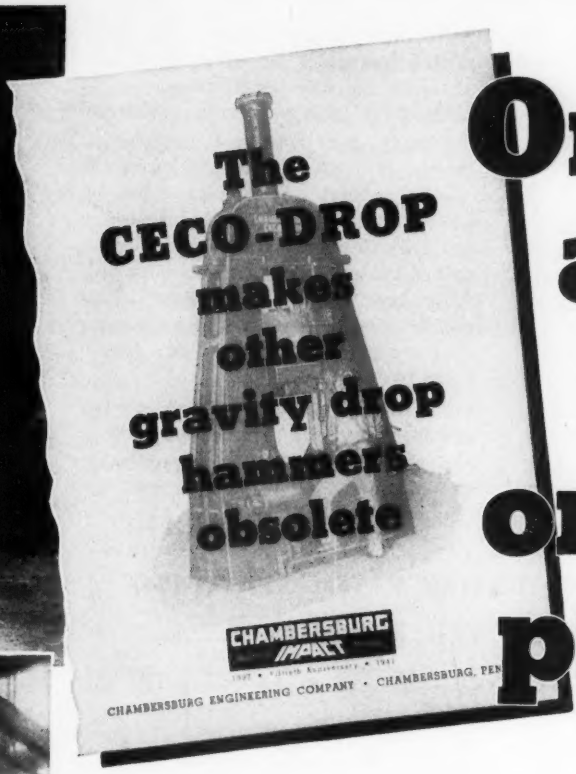


JET-PROPELLED HELICOPTER: These are some of General Electric Co.'s new facilities for the development and testing of components for the proposed jet-propelled helicopters, a part of the long-range program in the development of revolutionary aircraft for the armed services. Here inside an outdoor bowl-shaped pit, 150 feet in diameter and 13 feet deep, is a jet power plant and the giant rotary blade it whirls during tests. Developmental jet units are located at the tip of the blade









Orders and re-orders prove it!

The statement that the Ceco-Drop makes other gravity drop hammers obsolete may have seemed over-enthusiastic a year ago when this new hammer was introduced. But the experience of forge shops which have installed Ceco-Drops—and ordered more—is the best evidence that the statement is simple truth. As the facts are known, the list keeps growing.

Write for these facts

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

CECO-DROP

CHAMBERSBURG
Builders of IMPACT Machinery

index number for structural steel was 77.1 in 1913; the steel figure not only stood highest in the list but compared with 56.7 for all building materials. But in November of 1947, when the index number for structural steel was 143.0, the average for all building materials was 187.5.

The second table summarizes building material prices for selected periods, and is particularly interesting because it shows the rise in building labor costs which went on simultaneously.

In Part 1 of its report the committee majority recommended a program which can be achieved by enacting S. 866, the so-called TEW (Taft-Ellender-Wagner) long-range housing bill with some minor revisions. The committee concluded that to meet national needs, housing production must be pushed up to 1,250,000 to 1,500,000 dwellings per year and maintained there. It declared that the resources of the federal government must be used to provide the funds necessary to "achieve eventually a decent home and suitable living environment for all American families, with primary emphasis upon expanding and improving the housing services of private enterprise."

Early action is planned in the Senate to permit time for House action and the usual conferees' compromise of differences between the bills of the two bodies.

WHOLESALE PRICES OF BUILDING MATERIALS 1913-1947

[1926=100]

Period	All building materials	Building materials: Brick and tile	Cement	Lumber	Paint and paint materials	Plumbing and heating	Structural steel	Other building materials
1913	56.7	38.9	59.6	54.0	50.8		77.1	63.1
1914	52.7	38.8	55.0	49.9	50.7		60.0	59.7
1915	53.5	39.1	51.0	48.7	54.8	Not	65.3	65.1
1916	67.6	42.4	65.4	55.1	77.1	com-	128.9	87.8
1917	83.2	50.2	80.3	72.2	95.3	puted	190.8	114.0
1918	98.6	66.7	94.6	83.5	121.9	as sep-	153.2	121.0
1919	115.6	91.9	102.3	113.0	140.3	arate	128.7	116.8
1920	150.1	118.4	117.2	165.2	148.1	sub-	144.4	135.0
1921	97.4	105.7	110.8	88.9	83.9	group	104.4	111.1
1922	97.3	99.4	103.5	99.1	93.8	prior	88.5	95.3
1923	108.7	103.6	107.9	111.8	101.3	to 1926	123.7	105.5
1924	102.3	103.4	105.7	99.3	99.7		114.2	104.0
1925	101.7	100.1	102.6	100.6	109.3		102.2	100.4
1926	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1927	94.7	95.7	95.4	93.1	96.3	92.0	94.7	95.4
1928	94.1	95.6	92.5	90.5	93.1	95.1	95.2	96.7
1929	95.4	94.3	89.0	93.8	94.9	95.0	98.1	97.7
1930	89.9	89.8	89.8	85.8	90.5	88.6	87.3	93.3
1931	79.2	83.6	74.8	69.5	79.4	84.7	83.1	84.8
1932	71.4	77.3	74.3	58.5	71.1	66.8	80.9	79.5
1933	77.0	79.2	88.1	70.7	73.3	67.1	83.1	82.7
1934	86.2	90.2	93.1	84.5	79.5	72.6	90.8	90.3
1935	85.3	89.4	92.7	81.8	79.8	68.9	92.0	90.1
1936	86.7	88.7	92.2	87.0	80.1	75.0	95.0	90.2
1937	95.2	93.5	89.0	99.7	83.4	78.8	113.2	99.1
1938	90.3	91.0	90.3	87.4	81.3	78.5	111.0	92.7
1939	90.5	91.4	91.3	93.2	82.8	79.2	107.3	90.3
1940	94.8	90.5	90.8	102.9	85.7	80.4	107.3	93.3
1941	103.2	93.7	92.0	122.5	91.4	84.8	107.3	98.3
1942	110.2	98.0	94.0	132.8	100.3	95.4	107.3	103.5
1943	111.4	99.1	93.8	141.4	102.3	90.7	107.3	102.0
1944	115.5	101.7	95.8	153.3	105.2	92.2	107.3	103.1
1945	117.8	112.4	99.4	155.1	106.9	93.4	107.3	104.4
1946	132.6	122.9	104.1	178.4	118.5	103.8	118.4	118.6
1947—January	169.7	132.2	108.3	249.9	171.2	117.0	127.7	139.0
February	174.8	132.3	109.9	263.6	173.9	117.1	127.7	141.5
March	177.5	132.4	112.3	269.3	176.1	117.9	127.7	143.5
April	178.8	134.5	114.0	273.5	175.5	118.2	127.7	143.7
May	177.0	134.5	114.0	269.4	169.2	120.0	127.7	144.8
June	174.4	134.7	114.3	266.1	159.6	119.1	127.7	145.1
July	175.7	143.3	114.9	269.0	156.1	123.4	130.8	146.1
August	179.7	144.3	116.9	276.7	154.9	128.6	143.0	150.1
September	183.3	145.4	119.0	285.7	157.9	135.9	143.0	150.6
October	185.8	145.6	120.1	290.0	161.4	136.0	143.0	152.5
November	187.5	147.3	120.6	295.6	161.8	136.0	143.0	152.6

U. S. Department of Labor, Bureau of Labor Statistics.

WAGES AND PRICES IN BUILDING INDUSTRY

Item	August 1939	October 1946	January 1947	October 1947	Aug. 1939 to Oct. 1946	Oct. 1946 to Jan. 1947	Jan. 1947 to Oct. 1947	Aug. 1939 to Oct. 1947
	—Indexes of prices (1926=100)—				—Percent of increase—			
Manufacturers' prices, all building materials	89.6	134.8	169.7	185.8	50	26	9	107
Brick and tile	90.5	127.8	132.2	145.6	41	3	10	61
Cement	91.3	106.5	108.3	120.1	17	2	11	32
Lumber	90.1	178.9	249.9	290.0	99	40	16	222
Paint and paint materials	82.1	119.2	171.2	161.4	45	44	—6	97
Paint	92.9	101.0	152.8	144.5	9	51	—5	56
Paint materials	71.8	141.3	194.6	182.9	97	38	—6	155
Plumbing and heating supplies	79.3	107.2	117.0	136.0	35	9	16	72
Structural steel	107.3	120.1	127.7	143.0	12	6	12	33
Other building materials	89.5	122.5	139.0	152.5	37	14	10	70
	Average hourly earnings							
Average hourly earnings on private building construction	$0.924	$1.526	$1.594	$1.738	63	4	9	88

U. S. Department of Labor, Bureau of Labor Statistics.

700 Projects in Research Plan

The Navy's program in basic research comprises approximately 700 projects in more than 150 universities and nonprofit laboratories, according to Rear Admr. P. F. Lee, chief of naval research. These projects, says Admiral Lee, reach into "every field of basic science and are in the hands of many of the most distinguished scientists in the country."

The whole program, he says, is keyed in with an axiomatic saying of Secretary Forrestal—that "wars are fought primarily with weapons which are developed before the fighting begins."

The Navy's scientific research program, according to Admiral Lee, now is costing at the rate of $18 million annually. The Navy, he says, has contracts with 16 laboratories covering work in cryogenics (the physics of low temperature) and these are equipped to work at temperatures as low as minus 430 degrees Fahr. with liquid hydrogen and minus 452 degrees Fahr. with liquid helium. The Navy also continues actively to encourage research in basic nuclear physics and is assisting a number of universities with the installation of equipment and techniques for advanced studies in this field.

Plan Sprinkler Irrigation

Steel will find a new market in irrigating the semi-arid regions of the West, it is indicated by a Department of Interior report recommending the first sprinkler irrigation project in federal reclamation history. This is slated to bring Columbia river water to an orchard and specialty-crop area near The Dalles, Oreg. In this project, if approved by the governors of the Columbia river basin states, the Secretary of the Army and other officials concerned, water would be raised by an electrically operated pumping system and delivered under pressure to the site to be irrigated through 141,000 feet of steel pipe of varying diameter. The water would first go into an equalizing reservoir and from there through pipes to the orchards. Each farmer would control the water supply by manipulating his own adjustable pressure-reducing valve. The sprinklers would be bought by the farmers.

The new method, Interior officials say, has some decided merits in contrast with traditional irrigation.

"The traditional method of bringing irrigation water to arid lands," Commissioner of Reclamation Michael W. Straus said, "is to deliver it by canals and distribution laterals to connecting farm irrigation ditches."

"Taboo" Exports Being Listed

Shipment of implements of war to Russia and satellites prohibited by Presidential proclamation. Complete list of such items in preparation

UNDER FURTHER development of new export policy by which, effective Mar. 1, all shipments to Europe require individual export licenses, manufacturers will be able to tell at a glance which export orders they can accept and which they must reject. Now under preparation is a new "positive" list of all items which, under the President's proclamation of Mar. 26, may not be exported to Russia or her satellites.

Because of the delicate nature of some of the policy angles involved, it may take several weeks to set up this list. The chore now is top business for a government group headed by David Bruce, assistant secretary of commerce, and composed of high officials from State, Agriculture, Interior, National Military Establishment, Security Resources Board and Atomic Energy Commission.

What Constitutes War Goods?—The President's order placed an embargo on "arms, ammunition, and implements of war," and listed not only arms but also aircraft, war vessels, poison gases and toxicological agents, fire control equipment and range finders, bombs and the like as belonging to this category. The question before the group headed by David Bruce is: How much farther does this term extend? Does it include machine tools, presses, power generating equipment and other items which may be employed for producing implements of war?

The new policy already has put an end to the former practice of allowing manufacturers and exporters the use of their own judgment to a large extent in deciding what to ship or not ship to Russia.

This policy thus will protect manufacturers against future charges of having shipped goods without taking the national interests into consideration. That there is need for such protection has been shown by recent expressions of a number of congressmen, particularly in the hearings of the Mundt subcommittee of the House Foreign Affairs Committee, who questioned the patriotism of manufacturers and exporters who had shipped aircraft, airplane engines and certain kinds of industrial equipment to Russia.

Attitude Has Changed—It is true, Commerce spokesmen say, that many items of goods now being loaded at New York for shipment to Russia would not be permitted to go to that country under the new export control policy. They point out that the former limited controls were set up at a time when the country was tired of government controls and at that time it was not expected that our relations with Russia would deteriorate to the present explosive status.

In line with the overall policy of Congress, the appropriation of the Office of International Trade was cut last year to a level that forced it to shrink its total payroll to some 125 individuals by the end of 1947. It was not until Congress on Dec. 30, 1947, enacted the present export control law, and voted a larger appropriation, that the OIT was able to expand sufficiently to administer the present controls. OIT now has some 400 persons on its staff and is adding as competent people become available.

At a press conference Mar. 26, Secretary W. Averell Harriman revealed that if the Russians undertake any retaliatory tactics he may ask Congress for controls over imports. Suppose the Russians should decide to cut off our vital imports of manganese and chrome ore and ship us more furs instead? Under such a condition, said the secretary, he would have to be clothed with power over imports in order to negotiate effectively.

Russian Trade Needed — Mr. Harriman made it clear that the new embargo on shipment of implements of war to Russia is by no means a total embargo. "We want to obtain certain products from Russia and eastern Europe," he said.

Mr. Harriman in his press conference indicated that our export controls probably will not remain frozen in the present pattern.

Following are the goods which, effective Apr. 15, are to be considered as "arms, ammunition and implements of war:"

Category I—Small Arms and Machine Guns: Rifles, carbines, revolvers, pistols, machine pistols, and machine guns (using ammunition of caliber .22 or over); barrels, mounts, breech mechanisms and stocks therefore.

Category II—Artillery and Projectors: Guns, howitzers, cannon, mortars, and rocket launchers (of all calibers), military flame throwers, military smoke, gas, or pyrotechnic projectors; barrels, mounts and other components thereof.

Category III—Ammunition: Ammunition of caliber .22 or over for the arms enumerated under (I) and (II) above; cartridge cases, powder bags, bullets, jackets, cores, shells (excluding shotgun); projectiles and other missiles; percussion caps, fuses, primers and other detonating devices for such ammunition.

Category IV—Bombs, Torpedoes and Rockets: Bombs, torpedoes, grenades, rockets, mines, guided missiles, depth charges, and components thereof; apparatus and devices for the handling, control, discharge, detonation or detection thereof.

Category V—Fire Control Equipment, Range Finders: Fire control equipment, range, position and height finders, spotting instruments, aiming devices, (gyroscopic, optic, acoustic, atmospheric or flash), bombsights, gun sights and periscopes for the arms, ammunition and implements of war enumerated.

Category VI—Tanks and Ordnance Vehicles: Tanks, armed or armored vehicles, armored trains, artillery and small arms repair trucks, military half tracks, tank recovery vehicles, tank destroyers; armor plate, turrets, tank engines, tank tread shoes, tank bogie wheels and idlers therefor.

Category VII—Poison Gases and Toxicological Agents: All military toxicological and lethal agents and gases; military equipment for the dissemination and detection thereof and defense therefrom.

Category VIII—Propellants and Explosives: Propellants for the articles enumerated in Categories III, IV, and VII; military high explosives.

Category IX—Vessels of War: Vessels of war of all kinds, including amphibious craft, landing craft, naval tenders, naval transports and naval patrol craft, armor plate and turrets therefor; submarine batteries and nets, and equipment for the laying, detection, and detonation of mines.

Category X—Aircraft: Aircraft; components, parts and accessories therefor.

Category XI—Miscellaneous Equipment: (a) Military radar equipment, including components thereof, radar countermeasures and radar jamming equipment; (b) military stereoscopic plotting and photo interpretation equipment; (c) military photo theodolites, telemetering and Doeppler equipment; (d) military super high speeds ballistic cameras; (e) military radiosondes; (f) military interference suppression equipment; (g) military electronic computing devices; (h) military miniature and sub-miniature vacuum tubes and photoemissive tubes; (i) military armor plate; (j) military steel helmets; (k) military pyrotechnics; (l) synthetic training devices for military equipment; (m) military ultra-sonic generators; (n) all other material used in warfare which is classified from the standpoint of military security.

Trade with Russia To Continue

TENSION OVER deteriorating relations between the Soviet Union and the United States, which precipitated demands that shipment to Russia of all materials which might aid in developing that country's war potential be stopped, has prompted government investigations and a partial export-curbing action.

The government took cognizance of the inconsistency of its "stop-Russia" foreign policy while still permitting export under license of potential war material by proclaiming aircraft and aircraft parts and other armaments (see above) as "implements of war" and as such subject to licensing by the State Department's Munitions Control Unit.

Investigators have discovered quantities of steel rolling mill equipment, electrical apparatus, smelting furnaces and oil well drilling equipment awaiting shipment to the Soviet, and reports that some domestically scarce oil well piping scheduled for export to other destinations is actually to be sent to Russia have been referred to

Congress for possible inquiry.

Ban's Effects Weighed—The administration has not taken any general trade-barring action because Russia would probably shut off its exports in retaliation. This is considered undesirable for two reasons: (1) Imports from Russia, although relatively small in dollar volume, include such important materials as manganese and chrome ores; and (2) cessation of trade might jeopardize the self-help nature of the Marshall Plan, which is contingent to some extent on revival of trade between western and eastern Europe.

Exports to Russia last year amounted to 1 per cent of total U. S. exports, compared to 1.6 per cent of the 1936-1938 total trade, according to Office of International Trade figures. Imports from Russia, conversely, have risen to 1.3 per cent of total receipts from abroad, as contrasted with 1 per cent in the prewar period.

In dollar value American commercial exports to Russia last year aggregated $98,938,000, consisting largely of various types of machinery. Exports in 1938 were $69,691,000, with price rises in the intervening period more than balancing the difference in dollar volume between the two years. Imports, chiefly of undressed furs, chrome and manganese ores, tobacco and cotton linters, totaled $77,102,000 in 1947, against the 1938 total of $23,500,000. Value of goods received from Russia was down 23 per cent from 1946 volume, with the entire drop occurring in undressed furs. Metallic ore shipments were up $3.5 million last year.

Tool Builders Ask Clarification — Representatives of the machine tool building industry, concerned that their products may be aiding in Russian industrial preparation for war, are pressing for a definite government stand on future shipments. If it should be determined that a ban on export of American-made machine tools to Russia would further America's present foreign policy, such a ban, machine tool men contend, should be agreed upon by all other countries in the interest of national defense. Unless such agreements were obtained nothing would prevent the recipient countries from re-exporting American tools to the Soviet, thereby nullifying the purpose of the American ban.

Tool builders, furthermore, say that if the government should take such action, some provision should be made to stockpile those tools which are being made in this country for Russian account. Severe financial losses would result if the government now barred export of machinery which has been in process of manufacture over an extended period. Industrial mobilization by the United States might be aided materially by the addition of these machines to the national stockpile, they add.

Russia Led in Tool Imports — Russian receipts of American-made machine tools were sizable last year compared with those by other European countries. The Russians took a greater volume of tools, dollarwise, from the United States than any other country. Exports by the United States to countries behind the "Iron Curtain," including Czechoslovakia and Finland, however, amounted to only slightly more than half the value of those shipments made to European Recovery Program nations. Of total U. S. machine tool exports last year, valued at $118,829,723, 40 per cent went to the 16 ERP-participating countries and Germany, while 22 per cent went to Russia and its satellites.

The total sent to ERP participants was $47,741,480, which was divided as follows: Austria $383,397; Belgium-Luxemburg $3,698,579; Denmark $391,916; France $13,006,344; Greece $797,902; Iceland $58,136; Eire $111,046; Italy $463,497; Netherlands $4,256,057; Norway $927,281; Portugal $651,162; Sweden $8,562,593; Switzerland $3,307,143; Turkey $1,499,517; United Kingdom $9,624,056; and Germany $2854. These totals do not in all cases include shipments to colonial possessions.

The total sent to Russian-influenced countries was $26,053,953, divided thus: Albania $20,905; Czechoslovakia $1,643,051; Finland $1,075,822; Hungary $210,873; Poland-Danzig $4,990,110; Russia $15,851,001; and Yugoslavia $2,262,191. Bulgaria, Estonia, Latvia, Lithuania and Rumania received no American machine tools.

British Hunt for Scrap Widens

BIRMINGHAM, ENG.

SCRAP HAS TAKEN the place of fuel as Britain's steel industry's principal worry. The shortage resulted in temporary curtailment of three steel furnaces in Scotland recently, and at various times since the first of the year six blast furnaces have been down.

Government concern over the effect continued scrap lack will have on the country's iron and steel production targets has prompted the minister of supply to appoint an independent committee to investigate and recommend special measures which might be taken to increase supplies. Announcing this move in the House of Commons, the minister said that although there has been some improvement in the general scrap position in recent weeks, the long-term outlook continues grave. At the end of February stocks were down to 348,000 tons, compared with 534,000 tons a year ago.

Seek More German Scrap — The ministry is considering expanding the capacity of some shipbreaking yards, and means to increase the tonnage of scrap imported from Germany are under study. At present it is doubtful whether one million tons of German scrap will be available this year and the current uncertainty over removing that scrap makes it impossible to set a definite target for deliveries from that country. Two contracts have been signed so far this year for German shipments, one in January for 50,000 tons and one more recently for 100,000 tons.

In the government's economic survey for 1947 it was pointed out that 3,607,000 tons of home-purchased scrap and 360,000 tons of imported scrap were consumed by the steel industry. Stocks of scrap at the end of the year were only slightly more than enough for two weeks' operations.

Wartime surpluses of scrap are rapidly dwindling, but determined efforts are being made to uncover all possible sources of supply this year. Required imports of steelmaking grades are placed at a minimum of 850,000 tons, and if more could be obtained it would release some of the pressure on pig iron.

Quota Cuts Feared — Because unfilled steel orders at the end of March were cancelled, nonpriority consumers are apprehensive about the future. They fear their allocations will be cut in order to help those industries which the government regards as having first claim. There is no doubt that exports will have to be increased since British steel and coal figure prominently in trade agreements which the country has negotiated.

There has been little change in the pig iron situation. Demand for foundry iron for light castings is still heavy, but owing to the urgent need for maximum production of basic iron, the amount of foundry grades is limited.

Belgian Firms Maintain High Engineering Activity

Engineering activity in Belgian

metalworking plants remains on a high level with some of the more important work involving war damage rehabilitation, ship fitting and equipment for new plants on the European continent and abroad.

Anteliers Metallurgiques de Nivelles will soon begin reconstruction of the Liege Val-Benoit bridge which was destroyed twice during the last war. This bridge constitutes an important link betwen the seaboard and central Europe and the Balkans. When rebuilt it will hold two railroad tracks. The reconstruction job will require 1860 metric tons of steel and is expected to be completed by summer of 1949.

At the Cockerill works, at Seraing, the second of a series of three diesel engines for Belgian liners is being assembled. Each of these engines has a weight of 620 metric tons. Based on a new design, the engines are claimed to have oil consumption ranging between 170 and 185 grams per horsepower per hour. They have eight double-acting cylinders and are capable of generating 9200 hp. The first engine, which has been completed, has given satisfactory test results and is in Antwerp for installation.

Anteliers de Construction et Chaudronnerie de l'Est has received an order for an ore plant and equipment to be built in the Belgian Congo. The same firm has also received an order for ore treating equipment from France.

Wage Structure Too Clumsy — A strong feeling has grown that the current wage system in Belgium is too complex and too costly. Since last year when the government attempted to stabilize prices and wages and set up regulations toward these ends, the paper work has been growing excessively burdensome. At present, a worker receives, in addition to his basic wage, the following extras: Facilities for co-operative buying of food and household goods; a bonus for production; a further bonus for diligence and extra output; two weeks paid holidays, plus 10 official holidays with pay; a share of a special distribution of 600 million francs last year; allowances for pensions, family allowances, unemployment, etc. The regular bonuses and pensions amount to 23 per cent of the basic wage and are paid by the employer. In addition the worker has withheld from his wages 8 per cent for his share of social security insurance. Because of the complexity of the bookkeeping operations required for the many deductions and payments, even relatively small firms must employ full-time clerks for this task alone.

CZECH CAR: Newest of the Czechoslovakian automobiles, exhibited at the 28th "Autosalon" in Prague, is the Tatraplan, featuring a 4-cylinder air-cooled, 50 horsepower engine. Speeds range to 130 kilometers per hour. Cost is about $2650. Authenticated News photo

British Metals Institute Meets

FORTIETH annual meeting of the Institute of Metals in London Mar. 16-18 was highlighted by the installation of a new president and three new vice presidents. In addition, three honorary members and two Fellows were elected.

As president of the institute, Sir Arthur Smout was named. He is a member of the board of Imperial Chemical Industries Ltd., with responsibility for its metal and ammunition interests. He served as a member of the council of the institute from 1924 to 1940, and as vice president from 1940 to 1943 and from 1946 to the present time. Dr. S. F. Dorey, Lloyd's Register of Shipping, A. J. Murphy, J. Stone & Co. Ltd., and H. S. Tasker were elected vice presidents.

As Fellows, Cecil Henry Desch and Lt. Col. Sir Henry Maitland Greenly were elected. The institute's Platinum Medal for 1948 went to Robert Crooks Stanley, chairman and president, International Nickel Co. of Canada Ltd., for his outstanding service to the nonferrous metals industry.

Technical Papers — The following papers were presented during technical sessions: "Calculation of Loads Involved in Metal Strip Rolling," by Dr. M. Cook, director, Imperial Chemical Industries Ltd., and Eustace C. Lake, research department of Imperial Chemical Industries Ltd.; "Hot Shortness of Some High Purity Alloys in the Systems Aluminum-Copper-Silicon and Aluminum-Magnesium-Silicon," by Dr. P. H. Jennings, research dept., English Electric Company Ltd., Dr. A. R. E. Singer, lecturer in Industrial Metallurgy, University of Birmingham, and W. I. Pumphrey, Dept. of Metallurgy, University of Birmingham; "A Consideration of the Constitution of Aluminum-Iron-Silicon Alloys and Its Relation to Cracking above the Solidus," by Dr. P. H. Jennings and W. I. Pumphrey; "Striations: Metallographic Evidence of Slip," by D. McLean, National Physical Laboratory, Teddington; "The Effects of Single and Multi-hole Die Extrusion on the Properties of Extruded Aluminum Alloy Bar," by Dr. L. Northcott, Armament Research Dept., Woolwich, D. McLean and Dr. O. R. J. Lee; "The Young's Modulus of Some Aluminum Alloys," by N. Dudzinski, Royal Aircraft Establishment, Miss J. R. Murray and B. W. Mott, Atomic Energy Research Establishment, and Dr. B. Chalmers, head of Metallurgy Division, Atomic Energy Research Establishment; "Pressure and Creep Tests at Constant Hoop Stress on Lead and Alloy 'E' Pipes," by Dr. A. Latin, British Insulated Callender's Cables Ltd., London; "Recent Developments in Corrosion-Resistant Aluminum-Magnesium Alloys," by Dr. I. P. Brenner, Royal Aircraft Establishment, and Dr. I. W. Roth, High Duty Alloys Ltd., Worcester.

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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Lincoln abandons integral-type body and frame construction to return to conventional structure. May be move to effect greater interchangeability of parts

DETROIT

ONE of the surprises of the 1949 Lincoln models, to be announced publicly within the next three weeks, is the abandonment of the former integral-type body and frame construction and the return to the conventional system of mounting the body on a frame of the usual siderail and cross member type. Just why this reversal of a trend which appeared to be developing throughout the automotive industry is not yet clear, particularly in view of the fact Lincoln pioneered this type of construction. The possibility is seen that by making the Lincoln conform with Mercury and Ford insofar as basic design is concerned, it was possible to effect some interchangeability of parts and thereby achieve production economies.

In outward appearance there is little family resemblance between the three new Ford lines, but a close inspection probably will reveal a degree of parts duplication that patterns the successful techniques worked out by Chrysler and General Motors. Both the latter have a considerable amount of interchangeability of parts, even entire bodies, between different makes, and the system has paid off handsomely. Thus, General Motors has practically identical bodies for Chevrolet, Pontiac and Oldsmobile, for Pontiac, Oldsmobile and Buick, and for Buick, Oldsmobile and Cadillac. By carefully working out different fender treatments and different decorative moldings, grilles, hoods, etc., each make appears unique. Chrysler and DeSoto have many interchangeable stampings and other parts, as have Dodge and Plymouth.

The top Ford production experts are intimately acquainted with such integration of manufacture, and if they have not applied the technique to Ford-Mercury-Lincoln models, then they are losing their grip.

New Frame Line Setup—Ford has set up a new frame-building line at the Rouge plant, which apparently will produce a substantial portion of frame requirements. Previously a good share of Ford's frames was supplied by Murray Corp. of America, from its Ecorse, Mich., plant and presumably this source will continue in the picture.

Meanwhile, assemblies of Ford models have stopped for the changeover to 1949 versions, with assembly plants running out their floats on 1948 models last week. Probably a month will elapse before the first of the new series rolls off the assembly line. Lincoln and Mercury were off to a slow start because of unbalanced parts inventories and some shortages, only a few hundred of each being assembled during the first two weeks of operations. A sharp boost in output is expected momentarily. About 1000 of each are required to sample every dealer.

With Lincoln dropping the unitized body-frame construction, only Nash and Hudson use the system, and both of these producers are solidly behind it. Chevrolet was toying with the idea while consideration was being given to a light-weight car. Other manufacturers are showing little interest in adopting the method which many believe will eventually become universal.

Bonanza for Welding Suppliers—The unitized body-frame or the "monobilt" body, as Hudson calls it, is a bonanza for suppliers of spot welding equipment, both portable and machine types. The Hudson body, for example, requires over 5300 separate welds. Small wonder, therefore, that manufacturers of resistance welding equipment report their shipments last year were five times average annual shipments during the 1938-39 prewar period and almost twice those of 1942, the peak war year. The automotive industry possibly can be considered the breeding ground of resistance welding—flash, spot, seam, projection and butt. It has proved a major contributor to automatic, high-speed, low-cost assembly and has spread rapidly throughout all industry.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

	1948	1947
January	422,277	366,205
February	400,577*	393,636
March	509,700*	443,588
April		445,137
May		404,191
June		421,466
July		400,944
August		364,478
September		444,501
October		461,536
November		417,493
December		492,109
12 mos.		5,055,284

* Preliminary.

Estimates for week ended:

	1948	1947
Mar. 13	114,689	105,496
Mar. 20	115,556	108,472
Mar. 27	108,057	100,355
April 3	102,000	97,385

Estimates by Ward's Automotive Reports

Protests Umpire's Decision

Union officials at Ford are trying their best to whip up a major dispute among their members over the termination of paid lunch periods at the company's plants. The change was made as the result of a decision rendered by the umpire on the company's labor contract. A clause in the contract provides there shall be no appeal from an umpire's decision, yet the officers of Ford Local 600 of the UAW-CIO toss this aside and make threats of strike action in protest. Through their weekly newspaper they make allegations the company is "squeezing" $8 million out of its employees by the change in paid lunch periods, despite the fact the company has said it would extend work shifts sufficiently so that take-home pay would be unaffected. Brash statements are published to the effect the company is now being run by former General Motors officials determined on wrecking the "human relations" policy of Henry Ford II. This is all so much poppycock and the writers of these diatribes know it. At the same time they must come up with some "angle" to keep trouble brewing.

As A. H. "Red" Motley told a Society of Automotive Engineers dinner audience in Toledo, O., last week, if unions would spend more time minding their own business—that of getting out the production and im-

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BODIES FOR OLDS: First shipment of station wagon bodies as it arrived in Lansing, Mich., for Oldsmobile. The bodies are built by Fisher Body Division of General Motors at its Cleveland plant, where production of this type of body was initiated last year for Chevrolet, now being extended to Oldsmobile. By early summer, output of station wagon bodies for both GM divisions will be transferred to a new Fisher Body plant at Euclid, O., which will also furnish bodies for sedan delivery trucks

proving productivity—instead of looking under every rock for some new disturbance, the country would be far better off. Even Walter Reuther, head of the UAW, is continually roaming far afield from automotive manufacturing, in the search for a new bone of contention. His latest is a screaming demand for the Michigan State legislature to appropriate public money to meet the problem of hospital bed shortages.

Deficiencies in T-H Act

C. E. Wilson, president of General Motors, in a recent address at Warren, O., reviewing several phases of "unfinished business" in the United States, pointed to several glaring deficiencies in the Labor-Management Relations Act of 1947. One is in respect to compulsory unionism. In Wilson's words: "Many of the same people who are loudly demanding antidiscrimination legislation based on race, creed, color or national origin are still advocating and supporting discrimination in employment based on union membership. As an example, they are demanding the elimination of the poll tax while advocating compulsory unionism which amounts to an industrial poll tax on the more basic right to work and earn a living."

Another piece of unfinished business, he adds, is the failure of the new labor law to properly define the area and scope of collective bargaining. This failure is resulting in continuing conflict over pensions, insurance, paid lunch periods and various other payments that have nothing to do with wages paid for work performed.

He called for congressional action to define and restrict collective bargaining to its proper sphere, eliminating the boundary areas into which unions are steadily encroaching. The inclusion of health and welfare plans within the scope of collective bargaining can only create new and unexplored areas of industrial dispute —which is of course exactly what unions would like to accomplish. Wilson suggests it should be made illegal for unions to attempt by economic force to require employers to bargain collectively over such plans, or to make participation in any such plans a condition of employment, and that the law be amended to specify that only rates of pay, hours of employment and the circumstances and conditions under which employees actually perform work come within the area of collective bargaining required by law.

He does not recommend restrictions on voluntary agreements on other subjects reached by an employer and a union, or on satisfactory arrangements that already have been developed. The current coal strike, apparently centered on the question of pension payments, is a deplorable example of a union's use of economic force to extend its power into these boundary areas of true collective bargaining.

Romney Quits AMA

Resignation of George Romney as managing director of the Automobile Manufacturers Association was an exploding bombshell in the industry last week. Even members of his own staff had no inkling of the event. He left the post he had held for nine years to become assistant to George W. Mason, president of Nash-Kelvinator Corp., and also president of the AMA. Only 40, Romney will be one of the youngest of the industry's leading executives, and likely will play a leading role in the future expansion plans of N-K, which are said to be most ambitious.

Successor to the post of AMA chief is affable William J. Cronin, who has been secretary of both the manufacturers' and sales managers' committees and has seen 15 years of service with the association.

Transport Needed in Europe

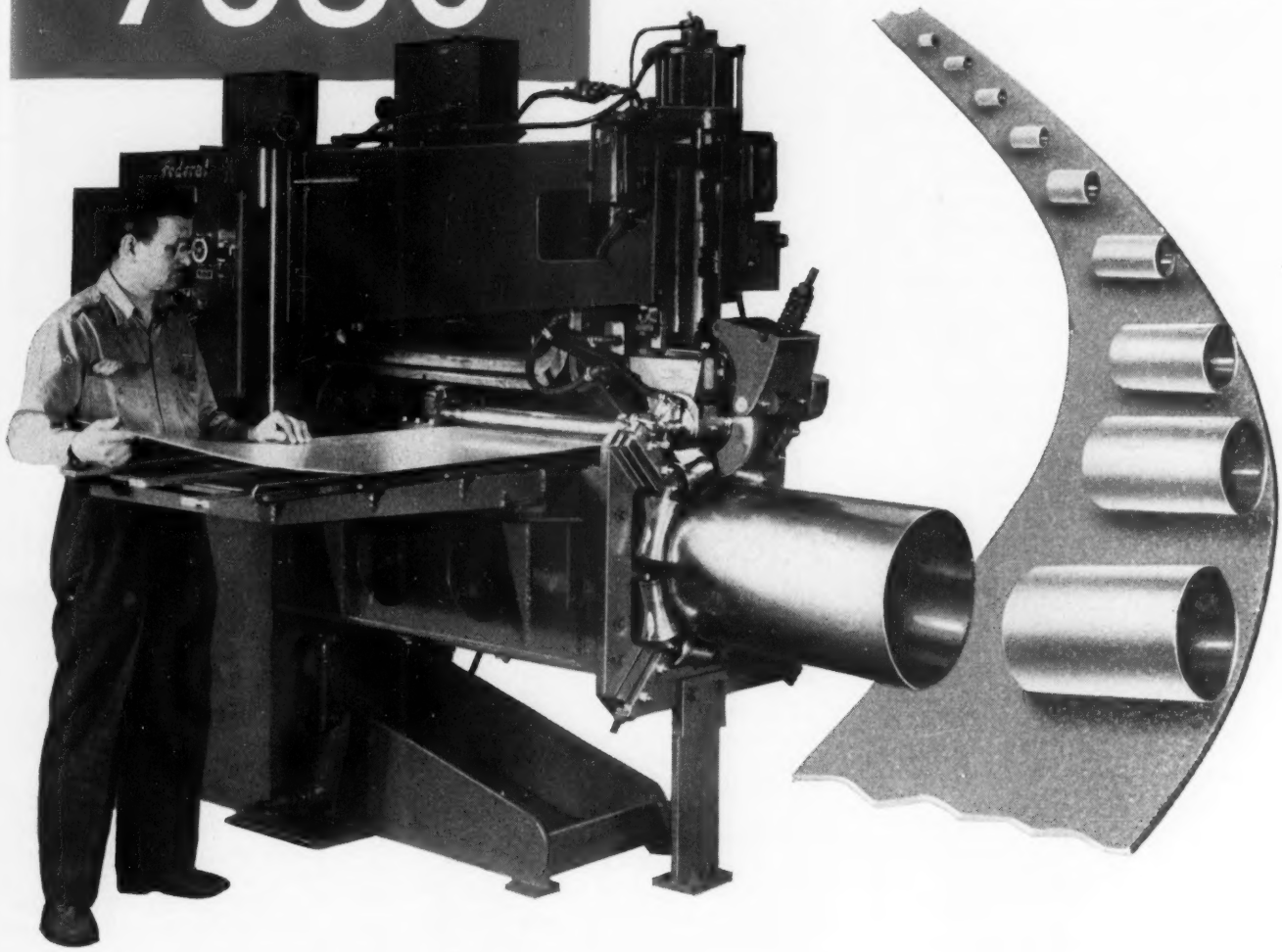
James D. Mooney, president of Willys-Overland, in a recent address, stressed the importance of rebuilding Europe's transportation as a vital part of any chance for recovery there. He said that while most talk thus far has been in terms of food and machinery, they will be of little use unless they can be moved over rails and highways to where they are needed, adding that the appointment of experienced railroad men, shipping men, highway builders and automotive personnel should be a must on this phase of ERP.

Briquette Coke Breeze

Experiments with the briquetting of coke breeze at a foundry of one of the General Motors divisions have proved highly successful. Normal practice calls for screening coke before use, resulting in a considerable quantity of fines which were of no particular value. Briquetting with 6 per cent cement yielded a product which could be charged readily in cupolas, with a higher heat value than the lump coke itself, because of the greater density. With coke selling at $20 a ton, some profitable disposition of breeze becomes almost an economic necessity. The plant in question is reported to accumulate as much as 15-20 tons of coke breeze daily.

7680

STEEL PAILS PER 8-HOUR WORKSHIFT ON ONE *Federal* SEAM WELDER



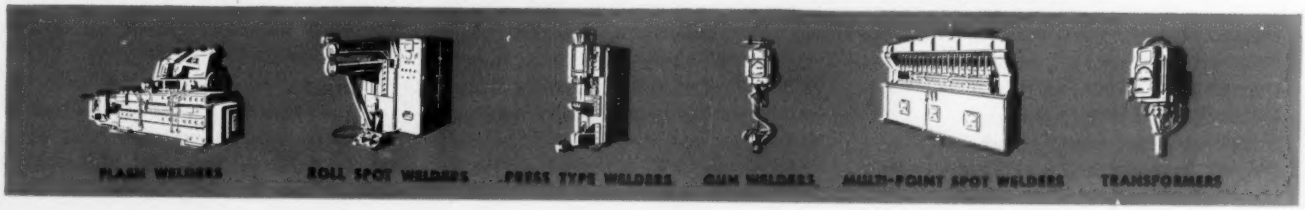
This astonishing production record is being achieved by a single operator on a standard Federal seam welder equipped with special jigs and fixtures and installed in the plant of a leading container manufacturer.

Once the machine is in operation, the operator merely feeds the sheets. Forming, locating, welding and ejection of the 20-gauge mild steel pail body is entirely automatic. This production figure is attained on a pail cylinder 24 inches in length and 14 inches in diameter. The machine is designed to accommodate pail bodies from 14 inches in length up to 30 inches, and in gauges from 20 to 26 in both plain and lithographed sheets, the production rate varying from 700 to 1500 units per hour depending on length of weld and thickness of metal.

Compare high quality and production rate to other methods and you will see why Federal resistance welding is slashing production costs everywhere. Put this modern profit-producing equipment to work in your plant. Federal's engineering department offers its services to solve your production problems. Arrange for a consultation at your convenience—there is no obligation, of course.

THE FEDERAL MACHINE AND WELDER COMPANY

Dept. 428, Plant 2, Warren, Ohio • • • *Offices in Principal Cities*



Allegheny Reports to Its Employees

OFFICERS of Allegheny Ludlum Steel Corp., Brackenridge, Pa., last week presented their second annual community report to employees and representative citizens of five cities in which plants are operated, including Buffalo, Dunkirk and Watervliet, N. Y., and West Leechburg and Brackenridge, Pa.

Participating in the programs were H. G. Batcheller, president, E. B. Cleborne, executive vice president, and Clark W. King, M. C. Harris, R. M. Allen, E. J. Hanley and F. B. Lounsberry, vice presidents. At Watervliet, President Batcheller presented medals and $500 checks to four employees for developing a method for rolling stainless steel T-sections. Such sections previously were formed by welding.

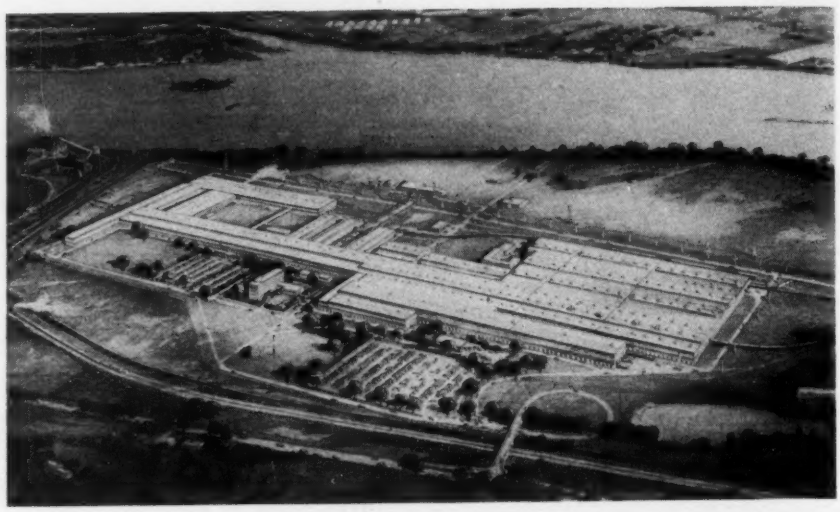
As part of a $24 million expansion and modernization program, the company is installing new blooming mills at Watervliet and Brackenridge, improved facilities for production of stainless, silicon steel and copper-coated carbon steel strip at Brackenridge and more stainless steel wire capacity at Dunkirk. Commercial production of precision castings for high temperature service has been initiated at Watervliet.

Aetna Bearing Sees Record Years Ahead

Aetna Ball & Roller Bearing Co., Chicago, manufacturer of bearings, ball retainers, washers, sleeves and bushings, anticipates all-time sales and production records for the next few years.

Company bases its prediction on the facts that its backlog now amounts to one year's production and that it has begun an expansion program, the seventh major capacity enlargement in its 33-year history. The expansion involves construction of a two-story addition to its main Chicago plant which will add approximately 20,000 sq ft of floor space. Equipment-wise, the program encompasses plant-wide relocation and revitalization of existing machinery, as well as the acquisition of new processing and materials handling facilities.

Net earnings for 1947 were $520,698, an increase of 59 per cent over the $326,484 reported in 1946.



More than 6,250,000 pounds of aluminum are being used in the construction of the Aluminum Co. of America's new sheet and plate rolling mill at Davenport, Iowa. Wall panels, doors and window sash are all aluminum. Twenty-five thousand tons of structural steel used in the framework is painted with more than three carloads of aluminum paint

Alcoa Building Iowa Rolling Mill

ALUMINUM Co. of America, Pittsburgh, has nearly completed construction of a sheet and plate rolling mill at Davenport, Iowa.

The plant, extending for nearly a mile along the banks of the Mississippi river, was constructed from 6,250,000 pounds of aluminum and 25,000 tons of structural steel, and represents the greatest single application of aluminum ever achieved in the building trades, according to Thomas D. Jolly, vice president in charge of engineering and purchases.

Aluminum Used Extensively—More than three miles of aluminum insulated wall panels, weighing over 1 million pounds, compose the bulk of the exterior surface of the project. The remainder of the exterior surface consists of nearly 500,000 sq ft of aluminum window sash, and part of the plant's 400-odd aluminum doors. Covering the rolling mill, which has grown on what was a 400-acre farm site two years ago, is an aluminum roof which sprawls over 47 acres and contains nearly 3 million pounds of the metal.

Dotting the roofs of the works, which is being equipped to turn out wide aluminum sheet, are 227 all-aluminum ventilators, ranging up to five feet in diameter. Surrounding the grounds and buildings is an aluminum chain-link fence, eight feet high and four miles long, containing nearly 2 million feet of aluminum wire. Three strands of aluminum barbed wire top the fence.

Aluminum Cable Utilized — Nearly 1 million pounds of aluminum cable, bus conductors and conduit were used at the new works. This included 1340 miles of insulated wire and cable.

Old Potter & Johnston Heads Form New Firm

Jacob Ziskind, president of Potter & Johnston Machine Co., Pawtucket, R. I., maker of turret lathes, reports that Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford, Conn., has purchased the good will, patents, patterns, jigs, fixtures, drawings and all the work in process inventory of Potter & Johnston Machine Co.

Plant and manufacturing equipment will remain under ownership of the old company which will be known as Darlington Industrial Corp. Pratt & Whitney has leased the plant for a term of years and will carry on operations at Pawtucket.

J. Earle Makant, in charge of plant operations, J. Potter Cunningham, in charge of sales, and Carl A. G. Birkedal, in charge of accounting, will become associated with Pratt & Whitney and will continue to function along the same lines as with the old Potter & Johnston Machine Co. It is anticipated that operations will continue in the Pawtucket plant, with present office and factory personnel continuing on their jobs.

Norman R. Earle, who was executive vice president of Potter & Johnston, will be executive vice president of Darlington, and Mr. Ziskind will be president and treasurer.

Briefs . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Steel Heddle Mfg. Co., Philadelphia, producer of textile machinery, is celebrating its 50th anniversary.

—o—

General Motors Corp., Detroit, has received an award of honor for distinguished service to safety in 1947 from National Safety Council. General Motors previously won this award in 1943, 1944 and 1945. Its accident frequency rate in 1947 was 26 per cent better than in 1946 and its severity rate in 1947 was 23 per cent better.

—o—

Industrial Plants Corp., New York, auctioneering firm, is managing the sale of a tool and die shop, formerly the property of Avco Tool & Machine Division, Avco Mfg. Corp., 1333 Alexis Rd., Toledo, O. Included in the sale, to occur Apr. 8, will be machine tools and other equipment, plus the plant itself.

—o—

Appliance Mfg. Co., Alliance, O., maker of washing machines, has purchased from Kulka Iron & Equipment Co. a plant containing 30,000 sq ft of space on N. Union Ave., Alliance. Facility will be used for washing machine production.

—o—

Alpha Metals Inc., Brooklyn, N. Y., manufacturer of solder products, lead specialties and related items, has appointed Senreb Sales Co., New York, as representative for its Solder Division in New England, New York state and northern New Jersey.

—o—

National Supply & Machinery Distributors' Association, Philadelphia, is circulating to individual manufacturers of industrial supplies and equipment recommendations of suggested standards for cost sheets and catalog pages.

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Buffalo Stainless Casting Corp., newly formed, has purchased the foundry and machine shop of Otis Elevator Co. at 813 Northland Ave., Buffalo. No sales price was revealed, but the property is assessed at $300,000.

—o—

Alabama State Chamber of Commerce announces that 155 new industries began operations in the state during 1947.

—o—

Link-Belt Co., Chicago, manufacturer of materials handling equipment, has established a district sales office at 137 E. Forsyth St., Jacksonville, Fla., with Robert L. Lowder as district sales manager.

—o—

Petroleum Engineering Corp. has been newly formed at 122 S. Michigan Ave., Chicago, to take over the engineering and construction work formerly handled by Petroleum Engineering Industries Inc. Walter H. Ogden, general manager of the original firm, has been named president and general manager of the new corporation.

—o—

Leslie Co., Lyndhurst, N. J., manufacturer of pressure and temperature regulators and controllers, strainers and whistles, has appointed the following sales agents: Welby C. Rouse, Greensboro, N. C., for North Carolina; Equipment Sales Corp., Kingport, Tenn., for eastern Tennessee; Landes, Zachary & Peterson, Denver, Colo., for Colorado, Wyoming, New Mexico and Utah, and El Paso, Tex.

—o—

SKF Industries Inc., Philadelphia, maker of ball and roller bearings, has elevated its branch office at Charlotte, N. C., to a district headquarters with territory embracing North and South Carolina, southern Virginia, eastern Tennessee and northern Georgia.

—o—

General Electric Co., Schenectady, N. Y., announces that research fellowships amounting to $22,075 have been awarded by its Educational Fund to 16 graduate students for advanced study.

—o—

E. I. du Pont de Nemours & Co., Wilmington, Del., has granted free licenses to 50 paint and lacquer companies for the manufacture of a metallic finish which Du Pont markets as "Duco" Metalli-Chrome lacquer.

—o—

Island Equipment Corp., manufacturer of materials handling equipment, plans to move to 27 Bridge Plaza North, Long Island City, N. Y., by May 1. Present headquarters are at 101 Park Ave., New York.

—o—

United States Steel Corp., Pittsburgh, reports that its common stockholders of record on Feb. 6 number 168,056, an increase of 243 since last November. Preferred stockholders of record on Feb. 2 total 75,755, an increase of 309 since last November.

—o—

Bituminous Coal Research Inc., Pittsburgh, has developed a coal-burning warm air furnace that can burn any kind of coal smokelessly. Furnace is for home operation.

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Vaporfier Corp., Chicago, maker of gas producing units, has formed a division, Combustion Systems, to design, build and install complete combustion equipment for all industrial heating applications.

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Crosley Division, Cincinnati, Avco Mfg. Corp., has reduced prices 7 to 16 per cent on its 1948 refrigerators.

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Department of Commerce has published "United States Associations in World Affairs," a booklet listing more than 900 trade, professional and cultural groups having a special interest in foreign trade and international affairs.

—o—

Dow Corning Corp., Midland, Mich., owned jointly by Dow Chemical Co. and Corning Glass Works, has opened a branch office at 1617-1/2 Elm St., Dallas, Tex., with Max H. Leavenworth in charge. Firm manufactures silicone products.

—o—

Office of the Foreign Liquidation Commission reports that 194 surplus U. S. Army crawler-type tractors, located in Yokohama, Japan, are being offered for bids in four lots. The machines may be imported into the United States until April 30.

—o—

War Assets Administration is offering for sale a channel carbon black plant in Sunray, Tex. Facility, currently operated under lease by Continental Carbon Co., originally cost $2,177,000.

—o—

Southern Alkali Corp., Corpus Christi, Tex., owned jointly by Pittsburgh Plate Glass Co. and American Cyanamid Co., announces completion by H. K. Ferguson Co. of a $10 million program at Lake Charles, La., which converted a surplus magnesium chloride plant into a chlorine and caustic soda facility.

—o—

International Bank for Reconstruction & Development has sent a fact-finding mission to Peru and Bolivia at the invitation of the governments of the countries. Mission will survey the present development and problems of the respective economies, to ascertain factors affecting continued economic development.

The Business Trend

IMPACT of coal mining suspension dropped STEEL'S index of industrial production five points in the week ended Mar. 27 to 159 per cent (preliminary) of the 1936-1939 weekly average. Full force of the walkout's effects is yet to be felt throughout the nation's economy, however. In the latest week operations in most metalworking industries were still high, but in the process of slipping.

STEEL—Primary steel output showed less of a decline in the Mar. 27 week than did blast furnace and foundry operations, the ingot rate easing off three points to 93 per cent of capacity. Coke production was drastically reduced immediately.

RAILROADS—The 25 per cent cut in use of coal-burning freight locomotives put into effect Mar. 30 will further reduce carloadings, and steel users are fearful the conservation move will slow shipment of raw materials to mills and will also delay their receipts of finished steel. In the first week of the mining interruption coal loadings amounted to 79,965 cars, a decrease of 114,436 from the preceding week.

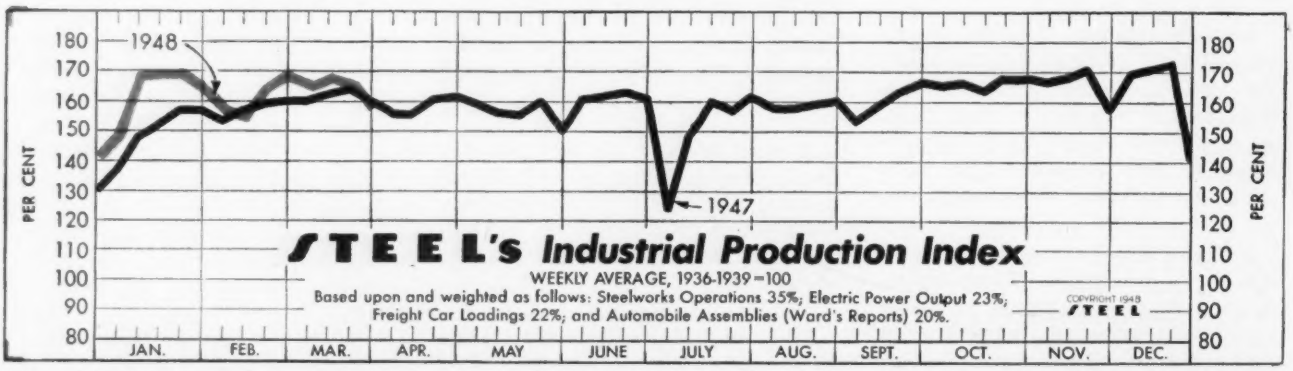
COAL—Bituminous coal and lignite production fell to 4,360,000 net tons in the walkout's first week, from 13,314,000 in the week ended Mar. 13. Bureau of Mines estimated coal carloadings on Monday Mar. 15 were 29,005, dropping to 6628 Friday and 5630 Saturday.

AUTOS—Automakers now regard the coal mining shutdown as a serious threat to production, with steel and pig iron inventories shrinking and becoming unbalanced. Production, however, remains above the 100,000 unit mark. The miners' walkout came too late in the month to prevent the industry in the United States and Canada from hanging up a new postwar monthly record of 509,700 vehicles.

ELECTRICITY—Warmer weather and more daylight, drought conditions in California, and the coal mining disruption with consequent reduction in industrial activity are easing some of the pressure on the electric power generating industry. The 140 million kwh drop in output in the week ended Mar. 20, although one of the sharpest on record, permitted the industry to relegate to standby some of its least efficient and more costly units. Under present load conditions many companies need use only their most modern equipment, whose coal consumption is only about one-half or one-third as large as the older units.

PRODUCTION — Overall industrial production was maintained in February at the high January level of 193 per cent of the 1935-1939 average, Federal Reserve Board's seasonally adjusted index shows. Durable goods output declined slightly as the result of severe weather conditions, although this drop did not extend to steel production which showed an increase.

PRICES—Between Jan. 15 and Feb. 15, retail prices of goods and services purchased by moderate-income families in large cities declined 0.8 per cent, according to the Bureau of Labor Statistics. The bureau's index registered 167.5 per cent of the 1935-1939 average or 9.3 per cent higher than a year ago.



Index (chart above): Week ended Mar. 27 (preliminary) 159 Previous Week 164 Month Ago 168 Year Ago 160

BAROMETERS of BUSINESS

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	93	96	93.5	97.0
Electric Power Distributed (million kilowatt hours)	5,065	5,145	5,252	4,729
Bituminous Coal Production (daily av.—1000 tons)	725	2,219	2,140	2,153
Petroleum Production (daily av.—1000 bbl.)	5,377	5,240	5,387	4,865
Construction Volume (ENR—Unit $1,000,000)	$137.9	$90.3	$128.7	$60.1
Automobile and Truck Output (Ward's—number units)	108,057	115,556	120,130	100,355

* Dates on request. † 1948 weekly capacity is 1,802,476 net tons. 1947 weekly capacity was 1,749,928 net tons.

TRADE				
Freight Carloadings (unit—1000 cars)	675†	700	791	829
Business Failures (Dun & Bradstreet, number)	105†	106	93	63
Money in Circulation (in millions of dollars)‡	$27,851	$27,920	$28,054	$28,170
Department Store Sales (change from like wk. a yr. ago)‡	+9%	+4%	+15%	+12%

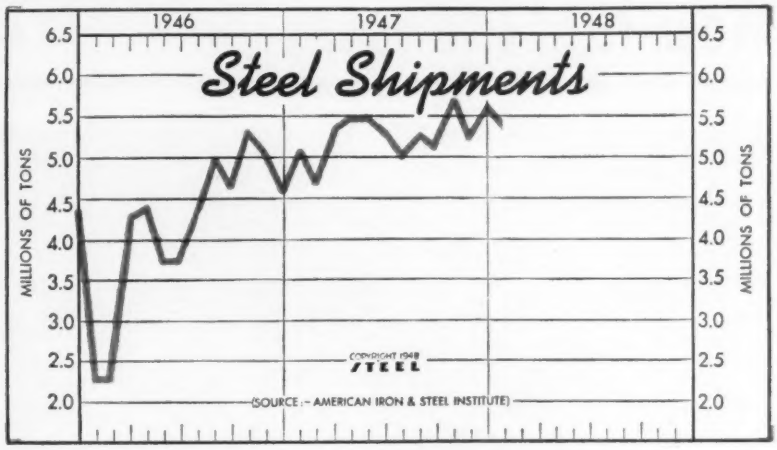
† Preliminary. ‡ Federal Reserve Board.

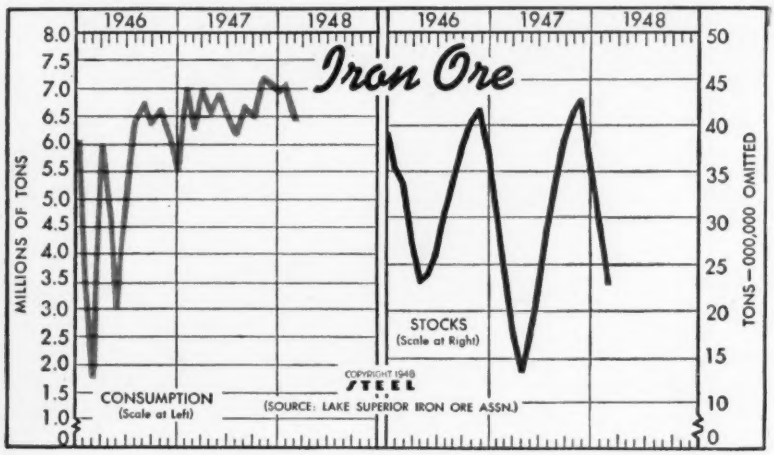
Steel Shipments

(Net Tons)

	1948	1947	1946
Jan.	5,410,438	5,061,333	2,189,369*
Feb.	.....	4,626,424	2,189,368*
Mar.	.....	5,304,415	4,213,913
Apr.	.....	5,445,993	4,335,694
May	.....	5,442,343	3,666,677
June	.....	5,263,711	3,687,509
July	.....	4,974,566	4,259,494
Aug.	.....	5,278,223	4,965,456
Sept.	.....	5,118,839	4,589,902
Oct.	.....	5,681,597	5,260,832
Nov.	.....	5,216,990	5,019,984
Dec.	.....	5,613,036	4,533,420

* Figures for January and February, 1946, are merely averages derived from a report that combined shipments for those two strike-affected months into a total of 4,378,737.





Iron Ore

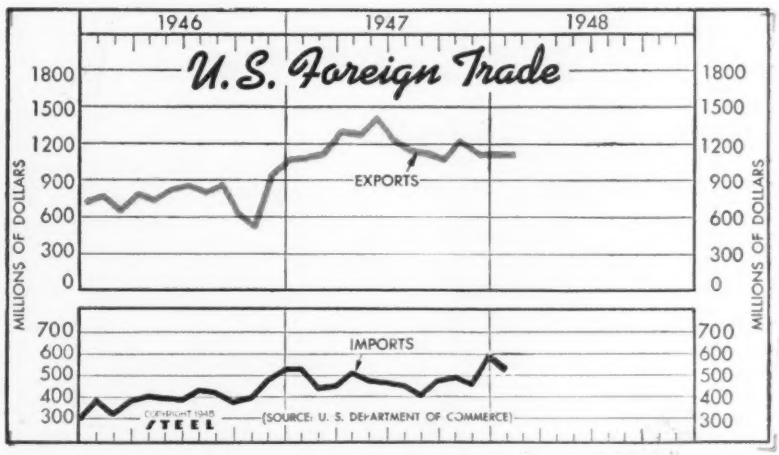
(Lake Superior Iron Ore Assn.)
Gross tons—000 omitted

	Consumption		Stocks at Lake Erie Docks and Furnaces	
	1948	1947	1948	1947
Jan.	7,057	7,024	29,081	30,514
Feb.	6,440	6,264	22,628	24,317
Mar.	....	6,979	.....	17,411
Apr.	....	6,579	.....	13,555
May	....	6,885	.....	17,618
June	....	6,500	.....	21,746
July	....	6,156	.....	28,440
Aug.	....	6,638	.....	33,896
Sept.	....	6,492	.....	38,370
Oct.	....	7,151	.....	41,641
Nov.	....	7,068	.....	43,010
Dec.	....	6,970	.....	36,095
Total	....	80,807		

Foreign Trade

Bureau of Foreign and Domestic Commerce
(Unit Value—$1,000,000)

	Exports			Imports		
	1948	1947	1946	1948	1947	1946
Jan.	1,100	1,114	798	544	531	394
Feb.	....	1,146	670	...	437	318
Mar.	....	1,327	815	...	444	384
Apr.	....	1,299	757	...	512	406
May	....	1,421	851	...	474	393
June	....	1,242	878	...	463	382
July	....	1,162	826	...	450	431
Aug.	....	1,151	883	...	400	422
Sept.	....	1,109	643	...	481	377
Oct.	....	1,235	536	...	492	394
Nov.	....	1,138	986	...	455	478
Dec.	....	1,112	1,097	...	601	529
Total	....	14,456	9,740	...	5,740	4,909



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$14,051	$15,212	$11,712	$12,913
Federal Gross Debt (billions)	$253.1	$253.5	$254.7	$259.2
Bond Volume, NYSE (millions)	$20.4	$17.5	$15.6	$17.6
Stocks Sales, NYSE (thousands)	5,706	5,875	3,092	4,448
Loans and Investments (billions)†	$63.8	$64.1	$64.3	$63.9
United States Gov't. Obligations Held (millions)†	$36,061	$36,193	$36,634	$40,141

† Member banks, Federal Reserve System.

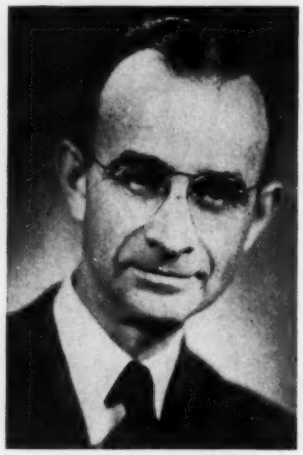
PRICES

STEEL's composite finished steel price average	$81.14	$81.14	$81.14	$69.82
All Commodities†	161.5	159.8	159.2	149.0
Industrial Raw Materials†	176.5	174.9	173.6	164.3
Manufactured Products†	156.3	154.3	153.5	143.1

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

EARL W. STANSEL



D. F. KANE

K. J. CRIDER

Earl W. Stansel has been appointed assistant to Frank M. Beauregard, vice president in charge of operations of Mullins Mfg. Corp., Salem, O. He has assumed operating direction of the firm's plant in Salem and Warren, O. He has had previous experience as assistant plant manager of Frigidaire in Dayton, O.; factory manager of General Motors' Aeroproducts Division, Vandalia, O.; factory manager of Nash-Kelvinator, Lansing, Mich.; plant manager of Remington-Rand, Binghamton, N. Y., and works manager of LaPorte Corp., LaPorte, Ind.

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Lawrence B. Richardson, formerly vice president of Curtiss-Wright Corp., has been elected president of Fairchild Engine & Airplane Corp., New York, to succeed **J. Carlton Ward Jr.,** promoted to chairman of the board. Mr. Ward has been president since 1940. He will continue as the company's chief executive officer.

—o—

Willard J. Cox has been appointed sales manager of Electric X-Ray Corp., Milwaukee, subsidiary of General Electric Corp. He succeeds **Robert L. Lefevre,** who has been named marketing manager. Mr. Cox will direct all sales activities of the firm. He formerly was assistant sales manager. Mr. Lefevre succeeds **John H. Smith,** who has been promoted to the post of executive vice president, and a member of the board of directors.

—o—

M. A. Boyle has been appointed sales manager of the Solder Division of Alpha Metals Inc., Brooklyn, N. Y. He has been sales promotion and advertising manager, a position he had held since joining the company two years ago.

—o—

D. F. Kane has been appointed manager of the Dunkirk, N. Y., plant of United States Radiator Corp., Detroit. He has been connected with the corporation for 33 years, most of the time as office manager of the plant until six months ago, when he became acting manager.

—o—

L. W. Stolte and **Frederick J. Heaslip,** Fairbanks, Morse & Co., Chicago, have been elected to the board of directors of the company to succeed **A. E. Ashcraft** and **F. C. Dierks.** Mr. Stolte has been secretary of the company for the last year, and Mr. Heaslip has been director of purchases for several years.

—o—

George P. Gradolf, for many years vice president and treasurer of the Cincinnati Bickford Tool Co., Cincinnati, has been elected chairman of the board and treasurer, and **Ozni E. Schauer** has been named president and general manager of the company. **Neil C. Schauer** has been elected vice president and sales manager, and **L. Lee Schauer,** vice president and chief engineer. **Paul E. Heckel** has been elected secretary, and **C. Charlton Slete,** assistant treasurer.

—o—

J. A. Butler has been named treasurer of the Falk Corp., Milwaukee. Formerly assistant treasurer and comptroller, he has been associated with the company for 11 years, and assistant treasurer since 1941. He is succeeded as comptroller by **Joseph B. Cibulka,** formerly assistant comptroller, and who will also continue his duties as office manager. **Richard S. Falk,** assistant to the president, is the new assistant treasurer.

—o—

Appliance Mfg. Co., Alliance, O., announces the following new appointments: **F. W. McGrath,** formerly sales manager, named vice president in charge of sales. **K. J. Crider,** formerly factory manager, named vice president in charge of manufacturing.

—o—

American Engineering Co. announces appointment of **Commander Edward Hart** as manager of its New York office. A graduate of the U. S. Naval Academy, Commander Hart spent ten years in the U. S. Navy as a combustion expert. He had previously taken postgraduate work at Columbia University in combustion engineering. He later was associated with Peabody Engineering Co. in connection with oil burner applications, and A. O. Smith Co., where his work related to fluid power pumps.

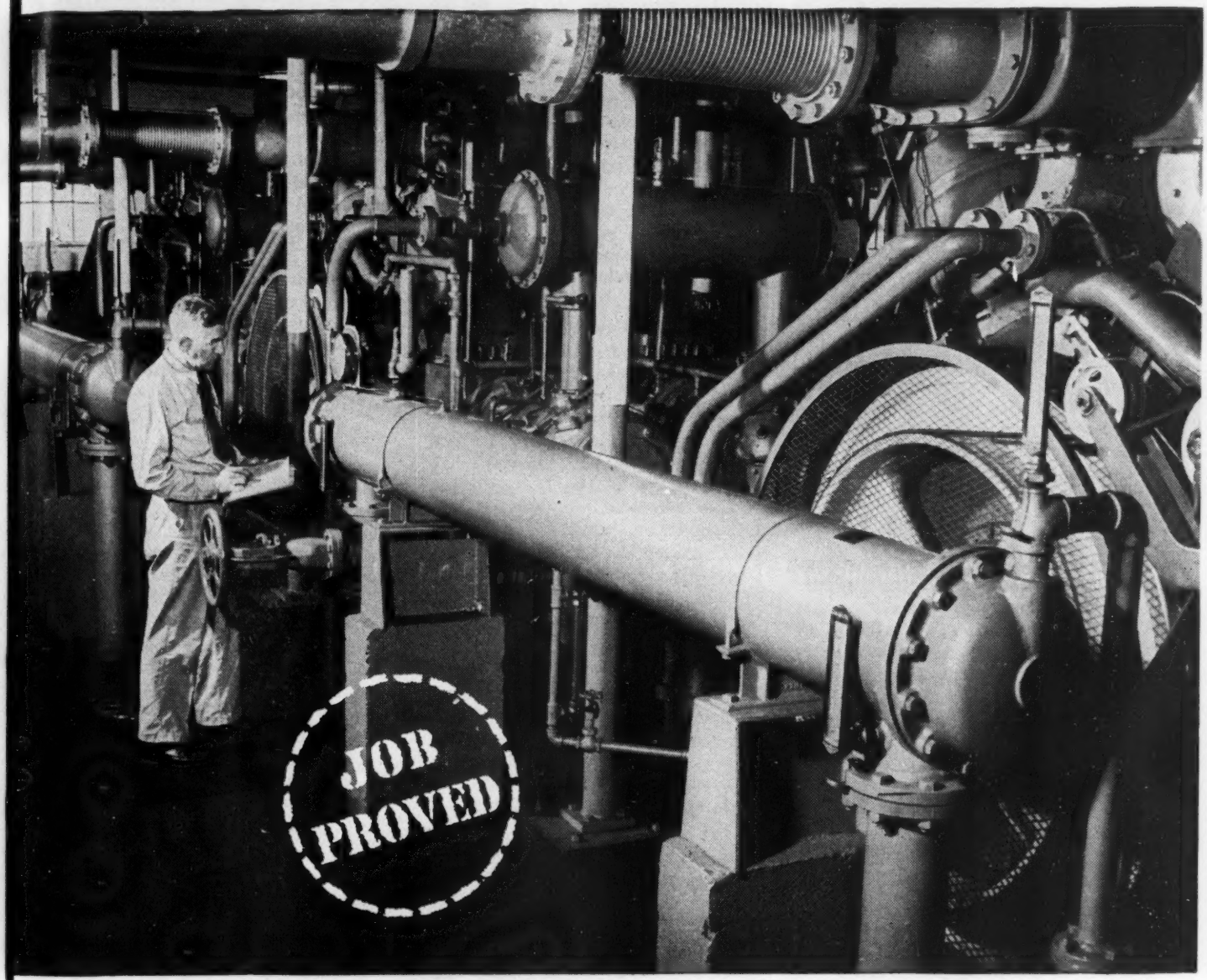
—o—

The Ball & Roller Bearing Division, Link-Belt Co., Chicago, announces appointment of Arthur E. Maha as assistant sales manager for the Central Division, with headquarters at the Dodge plant, Indianapolis. Announcement is also made of the appointment of **Lewis M. Watkin Jr.** as assistant sales manager for ball and roller bearings in the Eastern Division, with headquarters in Philadelphia.

—o—

Albert J. Capalbo has joined the flexible plastic coatings department of Interchemical Corp.'s Finishes Division, where he will serve in both a sales and technical service capacity,

Compressing Maintenance Problems



SUN COMPRESSOR LUBRICANT...

Keeps Compressors Operating Four Years on 24-Hour-a-Day Schedule

Twenty thousand and ten hours of trouble-free operation were piled up by one unit in a big, industrial plant operating a battery of heavy-duty 400 horsepower compressors. There was no time out except for routine inspections. Sun Oil was used from the very first hour these compressors were installed. When they were finally shut down for thorough inspection, no wear was apparent and no major parts had to be replaced.

Sun "Job Proved" industrial lubricants are making similar impressive records in all kinds of industrial plants, keeping production on an even, round-the-clock basis, holding down maintenance and operating costs. If you have problems concerning the lubrication of compressors, power plants, machine tools or other industrial equipment—remember the Sun Engineer is at your service without obligation on your part. Just phone the nearest Sun office or write Dept. S-4 . . .

SUN OIL COMPANY · ***Philadelphia 3, Pa.***

In Canada: Sun Oil Company, Ltd.—Toronto and Montreal

SUN

SUNOCO

INDUSTRIAL PRODUCTS

with headquarters in Elizabeth, N. J. He recently completed two years as chief chemist for the Plasticote Fabrics Corp., Passaic, N. J.

—o—

Dr. Harry D. Huskey, authority on large-scale automatic digital computing machinery, has been appointed chief of the machine development laboratory of National Bureau of Standards. He succeeds **Dr. E. W. Cannon,** who will henceforth devote full time to the duties as assistant chief of the national applied mathematics laboratories, of which the machine development laboratory is a part.

—o—

Five new personnel appointments in the research and development department of the Pennsylvania Salt Mfg. Co., Philadelphia, are as follows: **J. Philip Evans** has been named assistant to the manager of research and development. He was senior electrical engineer in the company's Central Engineering Division. **Clifton R. Neumoyer** has been appointed senior research chemist, Research Division; **Harold L. Warner,** associate patent attorney, Patent Division; **Joseph Simkin,** research chemist, Special Products Division; and **Charles A. P. vanHemert,** junior chemical engineer, Development Division.

—o—

John E. Allen has been appointed works superintendent at Central Furnaces and docks, Cleveland, American Steel & Wire Co., U. S. Steel Corp. subsidiary. He succeeds the late **N. B. Clarke.**

—o—

David S. Price, management and consultant engineer, has been appointed to represent the Brooks Equipment & Mfg. Co., Knoxville, Tenn., in the Great Lakes area.

—o—

Casey Mfg. Co., Oshkosh, Wis., has elected **E. G. Race** as president of the firm to succeed the late **William P. Casey.** Mr. Race formerly served as vice president. **Michael Duggan** has been elected to the board of directors to take the position vacated by Mr. Casey.

—o—

William W. Follett has been appointed regional sales manager of the Eureka Division of Eureka Williams Corp., covering the greater New York area and the state of New Jersey.

—o—

C. R. Nash, vice president of Aluminum Import Corp., New York, is on a tour of all of the countries of Central and South America, and West Indian points, conferring with the company's agents and large users of aluminum.

—o—

I. J. Harvey Jr., president of Flintkote Co., New York, has been elected a director of Sperry Corp., New York.

—o—

Dr. Harry A. Schwartz, director of research, National Malleable & Steel Castings Co., Cleveland, has accepted an invitation from the Institute of British Foundrymen to address that organization in London June 9. His lecture will be entitled "Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable."

—o—

The following personnel changes at the Buffalo and Palmer, Mass., plants have been announced by the Colorado Fuel & Iron Corp., Denver, Col.: **Alfred LeBlanc,** superintendent of the high carbon department at Palmer, has been appointed superintendent of wire mills at the Buffalo plant. **Joseph Marchelewiez** succeeds Mr. LeBlanc at the Palmer plant; **Joseph Cain,** melter at the Buffalo plant, has been appointed acting superintendent of the open hearth, succeeding **Martin A. Hotham,** resigned.

—o—

Howard P. Meredith has been appointed works superintendent at the Rankin Works, Rankin, Pa., for American Steel & Wire Co., U. S. Steel subsidiary. He succeeds **Charles J. Brown,** who has retired after 38 years of service with this subsidiary.

—o—

Charles W. Lange and **Claude B. Huston** have been awarded the Charles A. Coffin Foundation Award by General Electric Co., Schenectady, N. Y., for developing electric equipment benefiting the steel industry. Mr. Lange, until his retirement in 1947, was engineer in charge of the D-C Armored Motor Division, Erie Works. Mr. Huston has specialized in the application of electrical equipment to steel mill problems during the past 30 years. He joined General Electric in 1910, and has been an engineer in the Industrial Engineering Divisions, Schenectady Works.

—o—

G. E. Stoltz has been appointed consulting metalworking engineer of the industry engineering department, and **W. R. Harris,** manager of the metalworking section, same department, for Westinghouse Electric Corp., Pittsburgh.

—o—

Lewis R. Sanderson and **Dean D. Crandell** have been elected directors of the National Gypsum Co., Buffalo. Mr. Sanderson is vice president of operations, and Mr. Crandell, vice president in charge of sales.

—o—

To investigate market conditions and consult with field representatives, **Walter J. Selton,** export manager for Federated Metals Division, American Smelting & Refining Co., New York, left recently for an extensive trip through South and Central America.

—o—

Jerry I. Baron, president, Baron Steel Co., Toledo, has been elected president of the Chicago regional chapter of the National Association of Steel Distributors. Mr. Baron has been associated with the steel warehousing business for 18 years. He is president, also, of the Atlas Brazing Co., and vice president of the U. S. Metals Inc.

—o—

Walter V. Davidson Jr. has become manager of manufacturing for W. B. Connor Engineering Corp., New York.

—o—

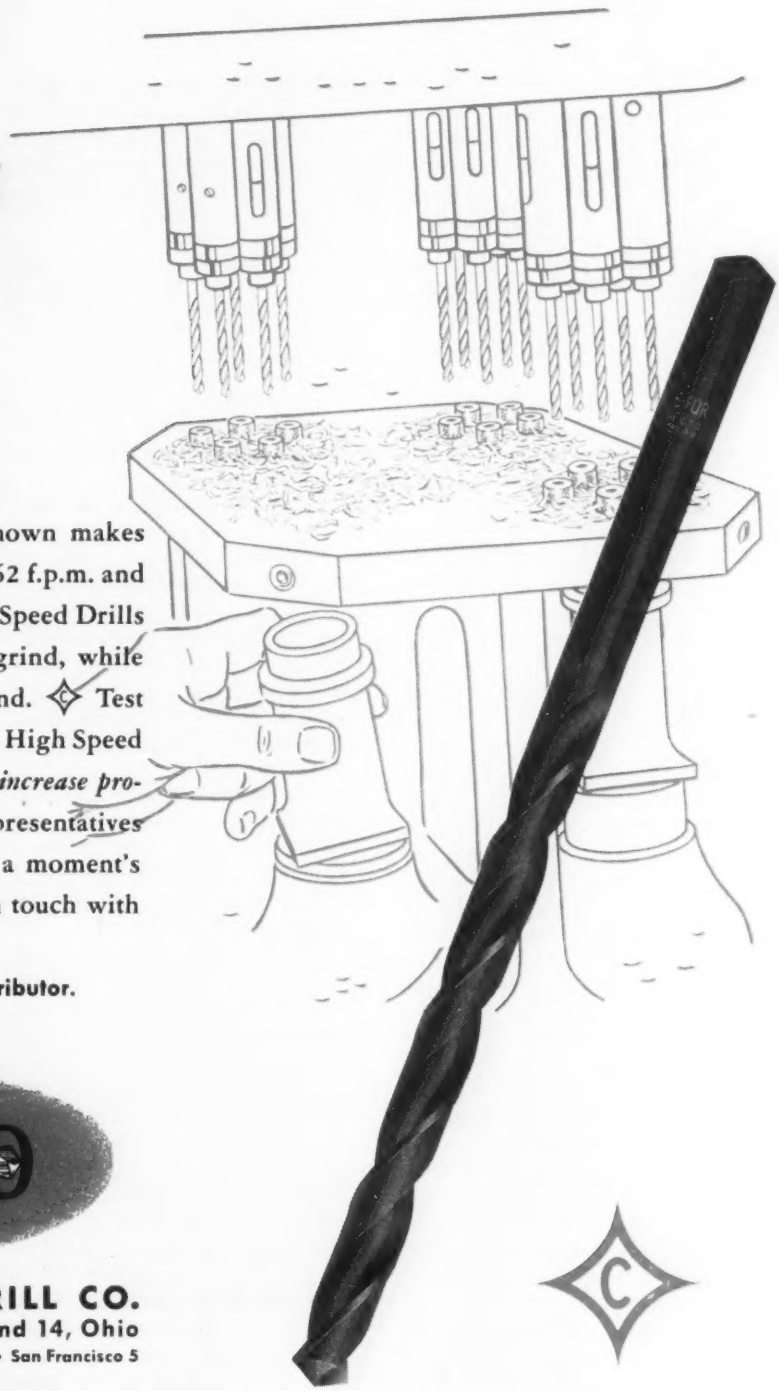
Leo Reierstad, formerly sales manager of the Chinese Aluminum Rolling Mills, Shanghai, associated with Aluminum Ltd., has joined the staff

CHARLES W. LANGE

CLAUDE B. HUSTON

Test Shows that CLE-FORGE HIGH SPEED DRILLS Give

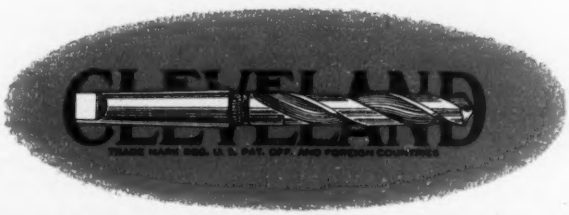
55% More Holes Per Grind



Drill Cost Reduced, Production Increased

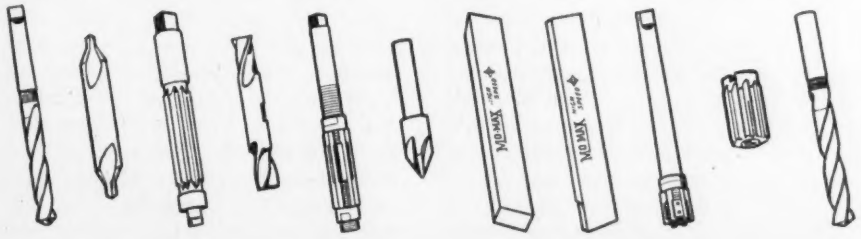
An automotive plant tested two well-known makes of drills on a cast iron part, at a speed of 62 f.p.m. and a feed of .0022 f.p.r. CLE-FORGE High Speed Drills produced an average of 124 holes per grind, while the other drills averaged 80 holes per grind. ◈ Test after test tells the same story! CLE-FORGE High Speed Drills are engineered to *cut costs* and to *increase production.* ◈ CLEVELAND Service Representatives are conveniently located to serve you at a moment's notice, without cost or obligation. Get in touch with our Stockroom nearest you, or . . .

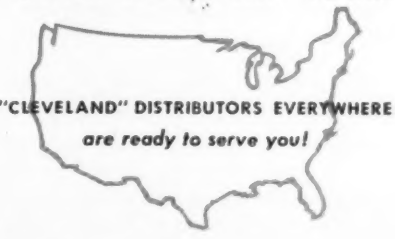
Telephone Your Industrial Supply Distributor.



THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street **Cleveland 14, Ohio**
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5
Los Angeles 11 • London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER CLEVELAND TOOLS





of the Aluminum Import Corp., in charge of its New York sales office.

—o—

Harry G. McDavitt Jr., formerly with Brown Fence & Wire Co., Cleveland, has joined the advertising and sales promotion staff of Apex Electrical Mfg. Co., Cleveland.

—o—

Richard M. Paxton Jr., formerly sales executive with Jessop Steel Co. in the metropolitan New York area, has joined the sales staff of Edgecomb Steel Corp., Hillside, N. J.

—o—

Charles E. Stone, president of Interstate Drop Forge Co., Milwaukee, has taken up his new duties as a director of the National Association of Manufacturers.

—o—

Edward L. Bush has been appointed purchasing agent for the Michael Yundt Co., Waukesha, Wis., to succeed **Arbin Huff.**

—o—

Alice H. Drew, for the past five years advertising manager of Tel-Autograph Corp., New York, has been appointed director of advertising, Holtzer-Cabot Motors, Boston. She will make her headquarters in New York.

—o—

R. G. Huntress has been appointed manager of wire rope sales for California Wire Cloth Corp., a subsidiary of Colorado Fuel & Iron Corp., New York. He will operate out of Oakland, Calif., office to serve the Pacific Coast area. **R. R. Tatnall** has been appointed to the position of field service metallurgist in charge of customer relations for the Wickwire Spencer Steel Division of Colorado Fuel & Iron Corp.

—o—

John M. Garoutte has been appointed works manager of the cement plant of Permanente Metals Corp., at Permanente, Calif. **Howard Church** has been named successor to Mr. Garoutte as manager of Permanente's alumina plant at Baton Rouge, La.

—o—

Clarence H. Schuettenberg has been appointed sales manager of the Holcomb & Hoke Mfg. Co., Indianapolis. He formerly served as sales manager of the Stoker Division, Link-Belt Co., Chicago. **I. C. Stevenson,** formerly sales manager for Holcomb & Hoke, has retired.

—o—

American Car & Foundry Co., New York, announces appointment of **Frederick H. Norton** as vice president in charge of all sales for the company. He became associated with the firm in 1945 as an assistant vice president in the sales department. He formerly had been associated with American Steel Foundries, and in 1940 he was transferred to Washington to open a new office for the handling of the American Steel Foundries' activities with the government and foreign agencies. Mr. Norton succeeds **R. A. Williams,** who has resigned as a director and vice president in charge of sales to accept the presidency of Standard Railway Equipment Mfg. Co.

—o—

Walter E. Benoit, radio and electronics executive of Westinghouse Electric Corp., Pittsburgh, has been granted a two-year leave of absence to serve as treasurer of Industria Electrica de Mexico in Mexico City.

—o—

Paul Hawkins, a member of the sales force of Monarch Machine Tool Co., Sidney, O., will spend the next six months in Europe on a special assignment for the company.

—o—

E. Horton & Son Co., Windsor Locks, Conn., has elected the following to the board of directors of the company: **Donald B. Huntting, Douglas H. Thomson Jr., Mary A. Caffrey, H. Bissell Carey Jr.,** and **Paul W. Adams.** Mr. Huntting has also been elected president of the company; Mr. Thomson, vice president and treasurer; and Miss Caffrey, secretary. Mr. Huntting has had over 13 years' experience in the manufacture of chucking equipment, having been associated for that period of time with the Cushman Chuck Co., Hartford, Conn.

—o—

E. A. Pratt, New York consulting engineer, has been appointed the representative of International Organization for Standardization in its relations with the Economic and Social Council of the United Nations. He has had close working relations with the member organizations of the ISO as a former member of the staff of the American Standards Association.

—o—

W. A. Stone of Crystal River, Fla., has been appointed sales representative for the Swift airplane for the eastern United States by Texas Engineering & Mfg. Co., Dallas, Tex. Sales representative for the western half of the United States is **R. R. Millsap** of Fort Worth.

—o—

Monarch Machine Tool Co., Sidney, O., announces several additions to its field sales personnel: **Fred B. Roth,** formerly supervisor of the company's service department in Sidney, has been transferred to the West Coast as sales and service advisor to a number of dealers who represent Monarch in that area. He will have headquarters at San Francisco. **Clarence J. Caldwell** and **J. A. Garrison,** also former members of Monarch's service department, have been named field sales engineers for the company, with headquarters in Chicago. **John P. Wisener,** formerly in the engineering development laboratory, has been transferred to the Cleveland sales office.

—o—

Jacob Ziskind, president of Potter & Johnston Machine Co., Pawtucket, R. I., whose good will, patents, patterns, jigs, fixtures, drawings, and work in process inventory recently were purchased by the Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn., has been named president and treasurer of the Darlington Industrial Corp., formed as successor to the Potter & Johnston Machine Co., and which retains ownership of the plant and manufacturing equipment of the old Potter & Johnston company. Pratt & Whitney has leased the plant for a term of years. **Norman R. Earle,** who was executive vice president of Potter & Johnston Machine Co. for 40 years, has been named executive vice president of the Darlington Industrial Corp. **J. Earle Makant,** in charge of plant operations, **J. Potter Cunningham,** in charge of sales, and **Carl A. G. Birkedal,** in charge of accounting of the old Potter & Johnston Machine Co., will become associated with Pratt & Whitney Division, and will continue to function along the same lines as at the old Potter & Johnston Machine Co.

—o—

The following is a list of the executives of the newly-formed Potter & Johnston Co., Pawtucket, R. I., a wholly-owned subsidary of Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn.: **Frederick U. Conard,** chairman of the board; **Clayton R. Burt,** president; **E. P. Gillane,** vice president and controller; **J. Earle Makant,** vice president and factory manager; **J. Potter Cunningham,** vice president and sales manager; **R. W. Banfield,** secretary and treasurer; **Carl A. G. Birkedal,** assistant secretary and assistant treasurer.

—o—

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., announces the re-election of **David C. Griggs** as chairman of the board; **R. L. Wilcox,** president, **Z. P. Candee,** vice president; **L. S. Reed,** treasurer. **E. A. Anderson,** secretary, and **A. Dale Mitchell,** controller and assistant treasurer. The company also announces the following promotions:

HAROLD H. MUELLER

Who has joined the foundry service staff of Meehanite Metal Corp. at New Rochelle, N. Y. He will have headquarters at Cleveland office. Noted in STEEL, Mar. 29 issue, p. 66

EDWARD J. DUFFY

Has been made manager of the Ironton Blast Furnace Division at Provo, Utah, of the Kaiser-Frazer Corp., Willow Run, Mich. Noted in STEEL, Mar. 29 issue, p. 68

JOHN E. BARBIER

Sales manager, Murchey Machine & Tool Co., and in charge of tap sales for parent company, Sheffield Corp., Dayton, O. Noted in STEEL, Mar. 29 issue, p. 64

Irving H. Toles, assistant secretary, to vice president and director; **Joseph H. Schaeffer,** engineer in charge of Bolt & Nut Machinery Division, vice president; **F. S. Van Valkenburg,** engineer in charge of Eyelet and Wire Drawing Machinery Division, vice president; and **William T. Bannon,** personnel director, to assistant secretary. All four officials promoted have been affiliated with the company for 30 years or more.

—o—

Standard Railway Equipment Mfg. Co., Chicago, announces the election as president and director of **R. A. Williams. Arthur A. Frank,** former president, has been named to the newly created post of chairman of the board. **Arthur A. Helwig** has been elected vice chairman of the board, and **S. L. Beymer,** a vice president.

—o—

J. V. Naish has been appointed factory manager of Northrop Aircraft Inc., Hawthorne, Calif. **C. B. Spencer,** production superintendent, has been given an additional post as assistant factory manager. **Conrad Kunze** has been promoted to director of material.

—o—

Bethlehem Steel Co., Bethlehem, Pa., announces the retirement of **F. R. Body** from the sales department of the company. He has been connected with the bolt and nut industry for over 50 years, and has spent 47 years in sales work. He was first employed by J. H. Sternberg Co. in 1896, and upon the merging of that company, and four other concerns, to form the American Iron & Steel Co., began his career as a salesman. Upon purchase of American Iron & Steel by Bethlehem Steel Co. in 1917, he was transferred to sales department at the Bethlehem office.

—o—

Leonard Highley Jr., who has been associated with Hall Laboratories, Pittsburgh, since 1932, returns to the Pittsburgh offices after nine years' service in Birmingham. **G. Howard Smith** leaves Cincinnati after four years there, to work in the Birmingham district. **Robert G. Hobek** joins the Hall service engineering staff in Cincinnati, after serving since 1939 in laboratory work for the firm.

—o—

Members re-elected to the board of Koppers Co. Inc., Pittsburgh, are: **J. P. Williams Jr.,** chairman; **Robert H. McClintic, Richard K. Mellon, Lawrence N. Murray,** and **Brehon Somervell,** all of Pittsburgh; **William de Krafft,** Clementon, N. J.; **Stanley N. Brown,** Leesburg, Va.; **Donald D. Shepard,** Washington; and **John N. Marshall,** Bethlehem, Pa.

—o—

Henry A. Rome has been appointed manager of molded goods sales, United States Rubber Co., New York, to succeed **F. W. Archibald,** retired.

OBITUARIES . . .

James H. Herron, 73, consulting engineer and head of James H. Herron Co., Cleveland, died Mar. 29 of a heart attack, in Fort Lauderdale, Fla., where he had been vacationing. Prior to founding his own company in 1909, Mr. Herron had been vice president of Bury Compressor Co., Erie, Pa.; Detroit manager for the Motch & Merryweather Machinery Co., and works manager of Detroit Steel Products Co. He was a past president of the American Society of Mechanical Engineers, and a member of numerous other technical and business organizations.

—o—

Ernest L. Hartig, 67, who retired in 1946 as vice president and treasurer, Joseph T. Ryerson & Son Inc., Chicago, died Mar. 27 in Oak Park, Ill. He had continued as a director of the company with which he had been associated 45 years.

—o—

Ronald P. King, 43, assistant treasurer of Lockheed Aircraft Corp., Burbank, Calif., died Mar. 21 after a long illness.

—o—

Albert C. Burch, manager of market research for Thew Shovel Co., Cleveland, since 1938, and formerly president of Clydesdale Motor Truck Co., died of a heart attack Mar. 12 at his home in Sandusky, O.

—o—

Walter Wear Sr., 64, estimator at Watson-Stillman Co., Roselle, N. J., hydraulic equipment manufacturer died Mar. 26 of a heart attack.

—o—

George E. Nelson, 44, chief production engineer, Continental Can Co., Chicago, died suddenly Mar. 23 while in Syracuse, N. Y., on business. He had been associated with the company 25 years.

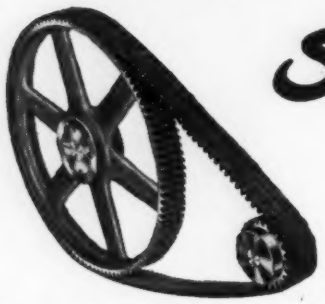
—o—

John J. Geder, 59, secretary-treasurer, Artos Engineering Co., Milwaukee, died of a heart attack recently. He had been an officer and part owner of the machinery manufacturing firm since 1918.

—o—

Harold Cornell, 53, vice president of the Cornell Wire Brush Co., Milwaukee, died suddenly Mar. 23.

MORSE ANNOUNCES NEW SILENT CHAIN STOCK DRIVES!



Users benefit by Morse standardization; early delivery available

INDUSTRY will profit in many ways by the development of this new silent chain standardization program.

A reduction in the number of parts carried in stock cuts down inventories, reduces storage space and simplifies ordering.

With industrial distributors stocking these new Morse *packaged* silent chain drives, industry will be able to obtain complete silent chain drives off the shelf, ready for immediate installation.

This new standardization program is certain to result in a sharp increase in the use of silent chain drives in industry.

Two large Morse plants, in Detroit and Ithaca, are meeting all schedules to make these new standardized silent chains and sprockets available.

Major industrial distributors everywhere will handle the new standardized Morse Silent Chains and Sprockets as they now do other Morse products.

Morse plans extensive stock drive program; Taperlock bushings standard

TOOLING has been completed at Morse for ½" and ¾" pitch chain sizes made to the new Silent Chain Standards. Also announced is a silent chain stock drive program covering both sprockets and chains.

The company's new stock drive program will include a series entirely different from the present line. All popular widths of chains will carry a single center guide link.

Sales Manager outlines plans

The General Sales Manager of Morse says that, henceforth, Morse cast-iron stock sizes of driven sprockets will have finished bores prepared for use with Taperlock bushings. Bushings will be available with finished bore diameters in increments of $\frac{1}{16}$ inch.

It is also pointed out that Morse driving sprockets will be furnished with finished bore diameters in the N.E.M.A. standard shaft sizes, complete with keyway.

Morse Chain's six dual-duty sprocket face widths will operate with eleven stock chain widths. It is possible to obtain as many as 40 ratios for each stock chain width. Such combinations are expected to cover 95% of the ratios required by all users.

Standardized stock silent chain will continue to be furnished with the exclusive feature — the Morse Rocker Joint.

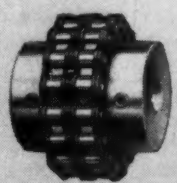
Write Morse Chain Company, Department 140, Detroit, Michigan, for Catalog C-71-48 giving complete information on the new Morse Silent Chain and Sprocket standardization program.

MORSE

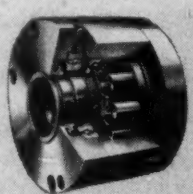
MECHANICAL POWER TRANSMISSION PRODUCTS

A PRODUCT OF B-W BORG-WARNER

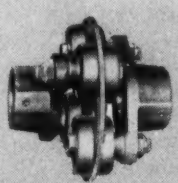
Morse Roller Chain Drives for positive power transmission.



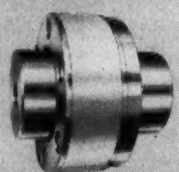
Morse Chain Couplings, for economical, easy installations.



Morse Free Wheeling Clutch for positive indexing.



Morflex Couplings are torsionally flexible and compensate for misalignment.



Morflex Radial Couplings are especially suited for heavy torque loads.

Engineering News . . . AT A GLANCE

NO "BEEFING UP" NEEDED—By simply distributing excessive stresses in the frame of its 30-ton punch press, Diamond Machine Tool Co., Los Angeles, was able to strengthen the frame by 38 per cent without resorting to "beefing up" techniques. To accomplish this, company engineers used Baldwin Locomotive SR-4 strain gages to take measurements under simulated operating conditions. Frame was improved by removing metal at the platen fillets, increasing the radii from ¼ to ¾-inch. Enlargement of the fillet reduced the stress from 23,000 to 14,050 pounds per square inch at 30 tons punch load.

ADAPTS DC POWER TO LOCOMOTIVE CRANES—Tractive effort at the rails is developed by two totally enclosed direct current series motors driving the axles through a single set of gears in the latest locomotive crane produced by American Hoist & Derrick Co. According to the company, electric propulsion is attained through a railway type direct-current generator and motors on the diesel powered crane. New drive results in reduced noise, maintenance and operator fatigue by eliminating mechanical propulsion through the center pin, and with it most of the gearing.

RADAR IN INDUSTRY—In scores of plants throughout many industries radio-frequency heating is the accepted production tool. Sets covering the range of rating from 2 to 200 kilowatts are becoming standard products and are being made in quantity, with demand pressing productive capacity. Most interesting new trend seen on the dielectric heating horizon, it was learned from Westinghouse, is the use of microwaves—radar frequencies. Early lab work with such extremely high frequencies for heat treating thin sheets and for curing insulation on wire as a continuous process is promising. Techniques for the work are borrowed directly from radar, and involve such radar components as magnetrons and waveguides.

PRINTED CIRCUIT USES WIDEN—Centralab Division of Globe-Union Inc., Milwaukee, which supplies printed circuits for hearing aids, soon expects to market a variety of printed resistance-capacitance circuits in form of subassemblies to replace conventional networks for applications in electrical measuring equipment, intercommunication systems and automatic control equipment. Among other companies that are expanding printed circuit developments is Gross Electronics Inc., Cleveland, which at present is working on a low-priced walkie-talkie suitable for construction work and other field uses.

TEST "MOTHBALL"—One of the latest, simplest methods devised for testing aircraft radiators consists of using models cast in naphthalene—the white substance of which mothballs are made, it was reported recently by Prof. Charles C. Winding, assistant director, and A. J. Cheney Jr., of Cornell University's school of chemical and metallurgical engineering. By blowing air over the naphthalene, it was revealed, the air causes the substance to evaporate. Then by noting rate of evaporation at different points of the model, engineers can estimate accurately cooling efficiency of the design. "Mothball" method only requires fabrication of simple plaster of paris molds in place of metal parts, with all necessary measurements being taken by a micrometer.

"FRETTING CORROSION" — No single solution, it is pointed out, may be generally applied to all problems of fretting corrosion otherwise known as "false brinelling" and as "friction oxidation." Since factors of motion are most vital in promoting this phenomenon, elimination or modification of one or both factors affords the best approach. In some cases, it is found, "fretting" action can be greatly reduced, although not entirely eliminated, by use of low-viscosity, fluid lubricants. Mobility as well as high film strength is important. (p. 72)

ELIMINATES "BENDS"—Outstanding feature of the new heat treating equipment recently installed in the Ambridge, Pa. plant of Spang-Chalfant Division, National Supply Co., is its ability to minimize distortion during the quenching operation. Here, alloy bars 54-feet in length can be provided with uniform hardness requiring very little cold straightening. In fact, slightly "bent" bars when properly placed in the V-notches of the furnace supports align themselves when heated to tempering temperatures. (p. 77)

RIM VS FLAT GRINDING—Reason for recommending that the rim and not the flat of a grinding wheel should be used for grinding surfaces where heat build-up is undesirable is clearly indicated in grinding of a casting. In "dulling" or loading the wheel with the work the outer surface of the metal is heated and tends to expand. Rigidity of the under surface metal at the same time "fights" against this expansion so that the surface layer plastically deforms under the acting compressive stresses. On cooling, the surface metal then contracts and is subject to outer fiber surface tensile stresses which may even exceed the tensile strength of the metal so that cracking results. (p. 79)

"PIN HOLER"—One or several pin holes of different diameters up to the capacity of the particular tool designed can be drilled in studs, bolts, pins etc., with the jig described by Robert Mawson. According to the author, holes can be machined in various positions, the jig being easy and quick to operate compared with the layout method. (p. 91)

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ENGINEER NEWSENG

By E. V. ALBERT
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Fretting Corrosion — How To Eliminate It

Still only partially solved, the problem of corrosion occurring on contact areas of loaded metal surfaces subject to oscillatory or vibrating motion, is gradually yielding to the impact of scientific study. This article is a progress report on investigations reported up to the present time on fretting corrosion, also known as false brinelling or friction oxidation

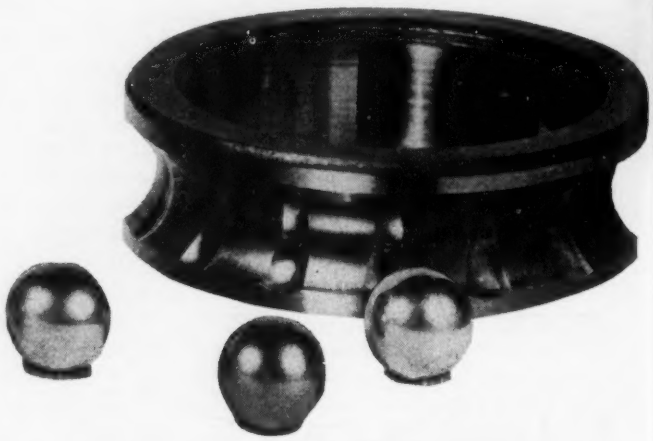
"FRETTING corrosion" is one of the terms applied to a particular type of corrosion found in the contact areas of loaded metal surfaces subject to oscillatory or vibrating motion. The phenomenon is also known as "false brinelling" and as "friction oxidation". The latter term is descriptive of the mechanism by which the oxidation or corrosion is believed to occur, and is widely used in the antifriction bearing industry. As correctly used, however, all three expressions apply to the same problem, which is more prevalent in machine parts than might generally be supposed.

Fretting corrosion, as we have chosen to call it, is probably one of the oldest mechanical-chemical problems. Only in the last two decades, though, have specific cases of fretting corrosion been differentiated from electrolytic and chemical corrosion or from brinelling (pressure indentation) of loaded surfaces.

In fact, it is often difficult to distinguish entirely between the damage caused by fretting corrosion and that caused by brinelling due to excessive loads or impact. The occurrence of a reddish or brown iron oxide residue is often the only clue upon which a diagnosis of fretting corrosion may be given as the true source of difficulty in a given instance. Another complication in recognizing fretting corrosion as the primary agent in a bearing or machine part failure is that secondary effects, such as galling or even welding of metal surfaces, may occur as a result of the initial surface disruption, and may reach such proportions as to obscure all evidence of the fretting corrosion which started the trouble. Fatigue failures, developing as a result of surface imperfections caused by fretting corrosion, sometimes result in cracking or fracture of the parts involved, with resultant damage that obscures the signs of the fretting corrosion to all but the most experienced investigators.

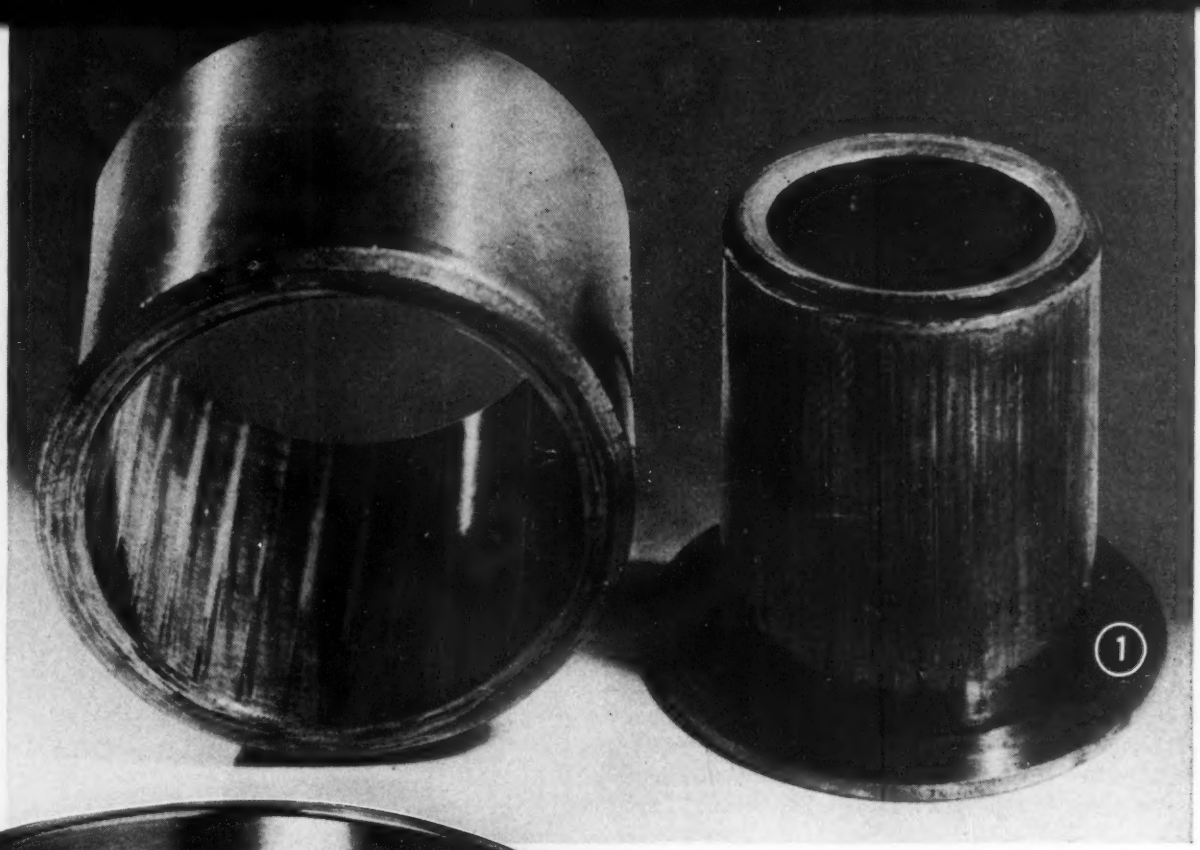
One of the most commonly cited and most widespread occurrences of fretting corrosion developed in wheel bearings of automobiles shipped by rail and highway transport from the Detroit area a little over 10 years ago. For the relatively short period during which difficulty was experienced, this problem resulted in one of the greatest monetary losses known to be due to fretting corrosion, inasmuch as replacement of at least the front wheel bearings on many thousands, if not hundreds of thousands of cars was involved.

The fretting corrosion, which was given the name "false brinelling" because of its resemblance to pressure indentation of the bearing races, was found to



be a result of vibratory contact between the balls or rollers of the bearings and the races, caused by motion of the rail cars or trailers. Trouble was experienced both with the automobiles resting on their wheels, restrained by cables and blocks under the tires, and with automobiles supported on blocks under the axles, with the wheels unsupported.

In the first instance, the slight motion or vibration of the automobile induced by motion of the freight car and by inertia of the auto's mass was sufficient to produce damage in the wheel bearings, even though the wheels themselves were unable to turn. In the case of the autos supported on the axles, oscillation of the front wheels through even extremely small angles, induced by vibration and by inertia of the wheels, coupled with the bearing loads due only to the weight of the wheels, was also sufficient to re-



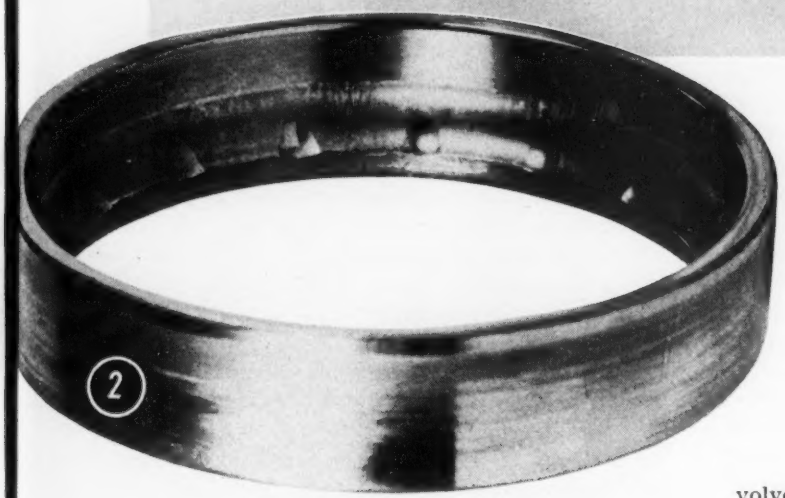


Fig. 1—False brinelling (fretting corrosion) of needle bearing. Courtesy Air Materiel Command, U. S. Air Forces

Fig. 2—Failure of bearing as a result of vibration with bearing not rotating—a severe example of fretting corrosion

sult in false brinelling or fretting corrosion at the contact area on bearing races.

Similar damage has been reported to antifriction bearings of electric motors and many other types of machinery when shipped assembled in freight cars. Ordinary means of restraining the rotors or shafts of such equipment are not always effective due to the extremely small motion which may be sufficient to produce the corrosion.

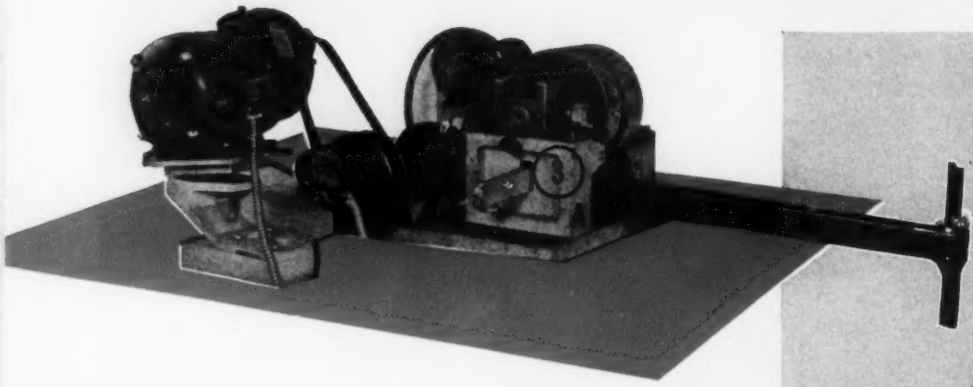
Fretting corrosion also occurs frequently on the races and balls or rollers of antifriction bearings which are under so-called static loads but are subjected to oscillation or vibration. This includes many aircraft control bearings, which may turn through only a very few degrees or may be subjected to continuous vibration from power plants or aerodynamic forces while operating. Even the most advanced machines are not immune, since this trouble has been experienced in the rotor hub bearings of certain helicopters. The bearings involved, which allow for cyclic change of pitch of the rotor blades as the rotor revolves, normally oscillate through only a few degrees and are also necessarily subject to vibration.

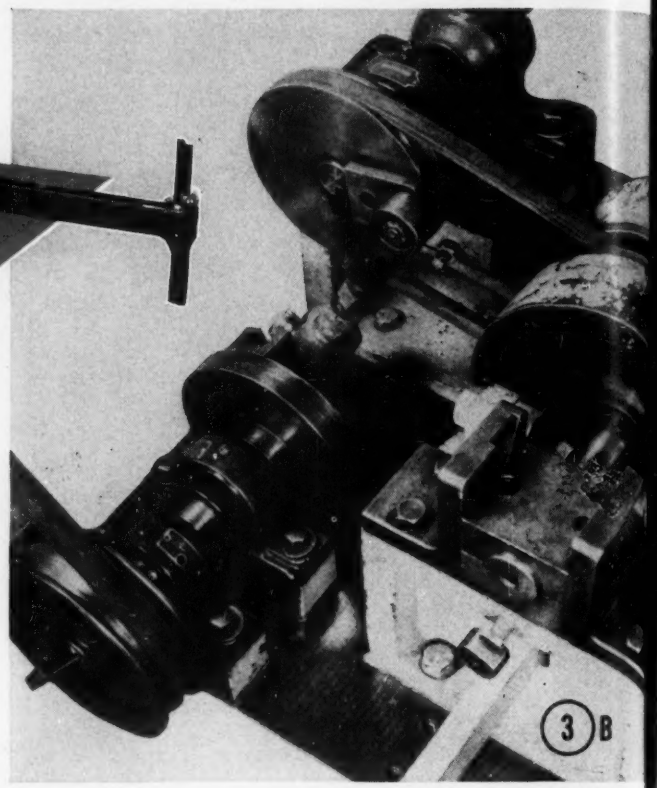
Vibration is also a cause of fretting corrosion in many so-called "fixed" contact surfaces, such as railroad rail end joints. Aircraft engine and variable-pitch propeller parts, either clamped and subject to vibration or else operating with limited motion, have been susceptible to severe fretting corrosion in some instances.

Reports have been made of fretting corrosion in many other different operations and types of equipment. These fall into the general classification given in the first sentence of this article; namely, they involve oxidation of the contact areas of loaded metal surfaces subject to oscillatory or vibrating motion.

Nature of Process—Nature of the process by which fretting corrosion takes place in ball and roller bearings and other rolling, sliding, or clamped machine elements has been studied by a number of investigators.

Of the experimental investigations that have been reported, nearly all were conducted with test machines employing limited oscillating or reciprocating motion, either of selected antifriction bearings or of special test samples in sliding or rolling contact. Pro-





visions were made in many of the test programs for variations in loading, motion, surfaces, and lubricants over a wide range.

Test work and analytical studies that have been made have resulted in adequate differentiation of fretting corrosion from electrolytic or galvanic corrosion. In the latter, oxidation of metals is accomplished indirectly through the galvanic action of the metals with water. Metallic hydroxides (compounds of metal + oxygen + hydrogen) are usually formed, through the exchange of metallic ions with hydrogen from water. For such corrosion to take place, the setting up of an electrolytic circuit is necessary, and the presence of water or some other ionized solution containing oxygen and hydrogen is a must.

Although this type of corrosion also involves oxidation of the metal, the oxidation has been found to be more direct, and electrolytic conditions are not required. The necessary conditions for fretting corrosion to occur on ferrous metal surfaces found are load, motion, and the presence of oxygen. Oxygen required for fretting corrosion is nearly always, if not always present, as it is very difficult to exclude entirely. In fact, the oxygen in the air dissolved in lubricants, or even that absorbed in the metal itself, can be sufficient to start fretting corrosion, which may then lead to surface failure through galling or fatigue.

Mechanical Rather than Chemical — Investigators agree that fretting corrosion is primarily of mechanical rather than chemical nature; however, there is not complete agreement on the exact nature of the mechanism by which it occurs. Tomlinson, in England, states that molecular effects and forces are at the root of the trouble, which is held to be direct oxidation of the surface as a result of high local heat from severance of cohesion bonds between the surface molecules.

Support is given to this theory by several of the pertinent findings listed by Tomlinson as a result of his studies. These are:

1. Corrosion appears to occur with little regard to the magnitude of the normal pressure at surface interfaces.
2. Severity of corrosion is increased with more highly finished surfaces.
3. Corrosion occurs with very small relative motion, of the order of molecular dimensions.

Some investigators have preferred the explanation first published by Fink, who concluded that wear resulting from fretting corrosion was caused by successively producing and rubbing off oxide surface films. In both theories, however, slipping is the real cause of trouble. Whether the oxidation is a secondary effect resulting from frictional heat from severed cohesion bonds due to slipping, or whether slipping rubs off protective oxide films, permitting corrosion to advance at a rapid rate, may not be critical in handling and solving problems of fretting corrosion. In fact, there is ample evidence that the mechanism may proceed either way in separate instances, dependent upon the loads, degree of motion, materials, and other factors involved.

This was recognized some time ago by Almen, who wrote that probably the conclusions reached by each of the several previous investigators whose results he had reviewed were justified within the limitations of their tests. In the same paper, the author also stated that Fink's theory of wear oxidation appears to meet most of the requirements in regard to false brinelling of ball and roller bearings in service. It was pointed out that this does not mean that wear of other machine parts in service can be explained by this theory. For instance, there are known conditions under which an oxide film on rubbing surfaces is beneficial.

Identification—An aid to identification of fretting corrosion and conclusions as to its nature as revealed by investigations at the Beacon Laboratories of The Texas Co. are summarized as follows:

"All cases of fretting corrosion received from the field to date have been accompanied by a reddish-brown deposit resembling mill scale. In one case concerning a deposit from specimens of machine parts, an analysis was performed using x-ray diffraction.

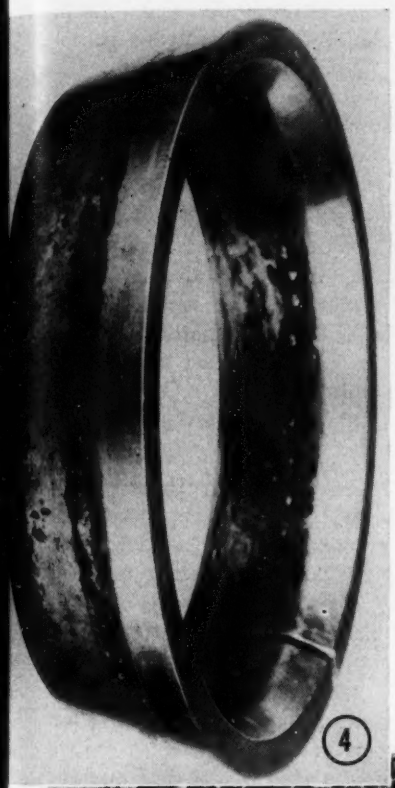
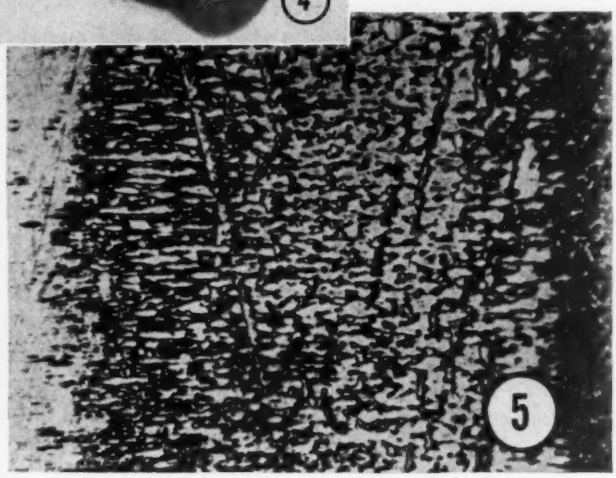


Fig. 3—(A) Test machine used to evaluate friction oxidation effects in antifriction bearings. (B) Close-up view of mechanism which produces oscillatory motion, with test bearing housing at extreme right. Courtesy Fafnir Bearing Co.

Fig. 4 — Aluminum bronze aircraft propeller hub cone, showing effects of fretting

Fig. 5—Photomicrograph of discoloration due to fretting corrosion on race of ball bearing at ball track. X500, unetched



This revealed that the deposit contained iron, copper and Fe_2O_3, being approximately 30 per cent Fe_2O_3. From this it may be concluded that, where steel or iron parts are involved, Fe_2O_3 is undoubtedly a product of fretting corrosion and hence x-ray diffraction offers a tool of fairly positive identification. In addition, insofar as the field is concerned, the usual occurrence of this deposit on iron or steel surfaces is of interest for identification purposes.

"Furthermore, it is evident that the Fe_2O_3 is not a product of a corrosion reaction, but may be considered to be the result of direct oxidation of iron as a consequence of some type of high load-high temperature operation. This would, of course, indicate that fretting corrosion is simply the raising of the temperature of a part to such a point through friction or reverse stressing of molecular proportions so that in the presence of oxygen, direct oxidation of the surface may occur."

Slipping—As mentioned above, slipping or the presence of sliding motion at the interface of loaded surfaces is a critical factor in establishing conditions for fretting corrosion. The limits of the required motion in any given case may vary from an almost infinitesimal quantity, of the order of molecular dimensions, up to the motion critical for oil film wedging, for lubricated surfaces.

In ball bearings, slipping cannot be entirely eliminated, in spite of the predominant rolling motion, due to the peculiar conditions attending the motion of the flattened contact surfaces as a result of elasticity of the steel balls and races. The flattened contact surfaces assume an elliptical shape under load. As the ball rolls, slipping occurs on portions of the contact area although the center may still maintain true rolling motion.

In the case of a roller bearing, the contact area is rectangular instead of elliptical, and the center of rotation a line, rather than a point. Sliding motion occurs on part of the contact area as the roller rotates, as a necessary result of the flattened contact area.

Under normal operation of a lubricated antifriction bearing, an hydrodynamic oil film, or at least a thin film, is maintained between the sliding areas of the contact surfaces. If the load is increased sufficiently to cause metal contact, failure of the balls or rollers and races will occur, usually through welding and pitting. Under the relatively small oscillation or vibrating motion which is within the field of fretting corrosion, insufficient motion of the balls, combined with reversals in direction, prevents the establishment and maintenance of an oil wedge. Thus metal to metal contact occurs, with resultant heat. Oxidation of the metal surfaces results. Oxidation of the lubricant as a result of this heat, leading to the formation of acidic materials, serves to increase the severity of the corrosion.

Effect of Load—The foregoing may explain why increased load has been found by many investigators to increase the severity of fretting corrosion of antifriction bearings. Higher normal pressures result in larger contact areas between the balls or rollers and races, as well as in greater frictional heat. Greater contact area results in greater slippage or sliding motion, thus increasing the tendency toward fretting corrosion.

On the other hand, the effect of load upon fretting corrosion of mechanisms other than antifriction bearings is not so consistent. Although with a given motion, the severity of corrosion usually has been found to increase with increased surface loading, in some machined parts, such as clamped or pressed joints, an increase in the surface loading is beneficial in reducing the severity of corrosion. This would appear to apply particularly to fretting corrosion cases which are due to induced or externally imposed vibrations, on which the motion may be reduced or eliminated by increasing the surface pressure.

Variations in clamping loads due to vibration have been found sufficient to produce fretting corrosion, with only very slight motion. Increasing the clamping load to prevent all motion, and at the same time minimize the effect of the variations in load due to vibration, is not always effective in such instances. An effective fix is sometimes provided by installing

a relatively soft shear coating or plate between the clamped surfaces, which leads to a discussion of the effect of surfaces themselves.

Effect of Surface Finish and Materials—Tomlinson's conclusion, that the severity of fretting corrosion is increased with more highly finished surfaces, has been confirmed by other investigators. Another pertinent finding from the literature is that corrosion of steel surfaces of the same degree of surface finish is more severe than that of surfaces of different finish, under the same conditons.

Similarly, it has been reported that surfaces of like materials, are more susceptible than those of unlike materials. Surprisingly enough, in view of its resistance to electrolytic corrosion, stainless steel has been found to be one of the materals most susceptible to fretting corrosion, although many other types of steel are affected to nearly the same degree. Combinations including nickel as one of the materials are among the least susceptible surfaces, and chromium plating of one of the surfaces has also been found effective in reducing the severity of fretting corrosion in some instances.

Two types of surface coatings have been proposed to aid in reducing or eliminating fretting corrosion under special circumstances: 1. A lubricant or shear coating to reduce friction or 2. a plated or treated surface to increase friction and prevent slipping.

The choice between these in any given case would necessarily depend upon the type of motion and surfaces involved and the direction from which benefit might be expected to be obtained—whether from a reduction in friction or from an increase in friction to reduce or eliminate sliding motion. Often, trial and error methods must be applied in order to determine the direction of benefit.

General Solutions — Unfortunately, there is no single solution that may be generally applied to all problems of fretting corrosion. Since the factors of motion and load are most vital in promoting fretting corrosion, elimination or modification of one or both factors affords the best approach to a solution.

Other suggestions for solution, some of which have been touched on above, include: 1. Elimination or exclusion of oxygen at contact surfaces. 2. Provision of an adequate lubricant or surface coating to reduce friction. 3. Provision of a plated or treated surface to increase friction and prevent slipping. (This, obviously, is the converse of 2.) 4. Provision of a gasket to absorb motion without metal pick-up or welding. 5. Increasing the hardness of one or both surfaces. 6. Inducing residual compression stresses at the contact surfaces through shot peening, surface rolling, nitriding, or carburizing. 7. Increasing motion in the operating region to a degree sufficient to maintain a protective lubricant film.

In discussing these suggested solutions, it should first be noted that not all are applicable or can be considered for a given problem, nor is their effectiveness uniform. For instance, in many machines, elimination of oxygen is im- (*Please turn to Page* 96)

Fig. 6—Severe fretting corrosion on aircraft gears as a result of high frequency vibration under high load

Fig. 7—Spalling on cup of roller bearing from bus wheel, showing fatigue failure apparently following fretting corrosion

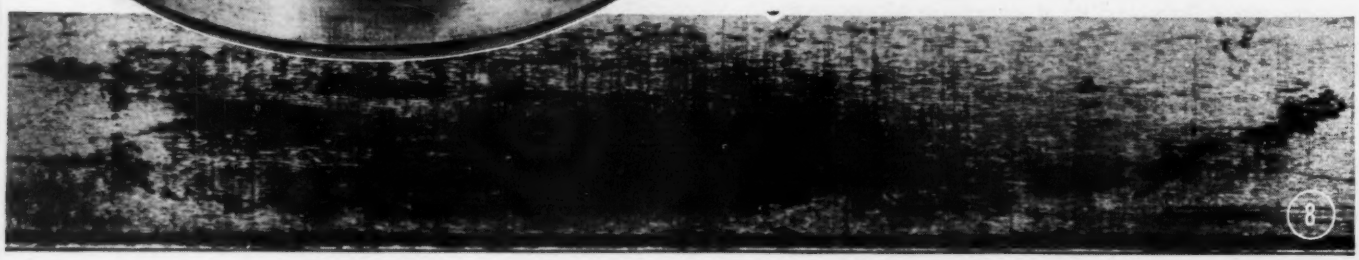


Fig. 8—Rotated view of segment of outer surface of ball bearing outer ring, showing fretting corrosion as a result of slight relative motion between ring and housing during operation with steady static load

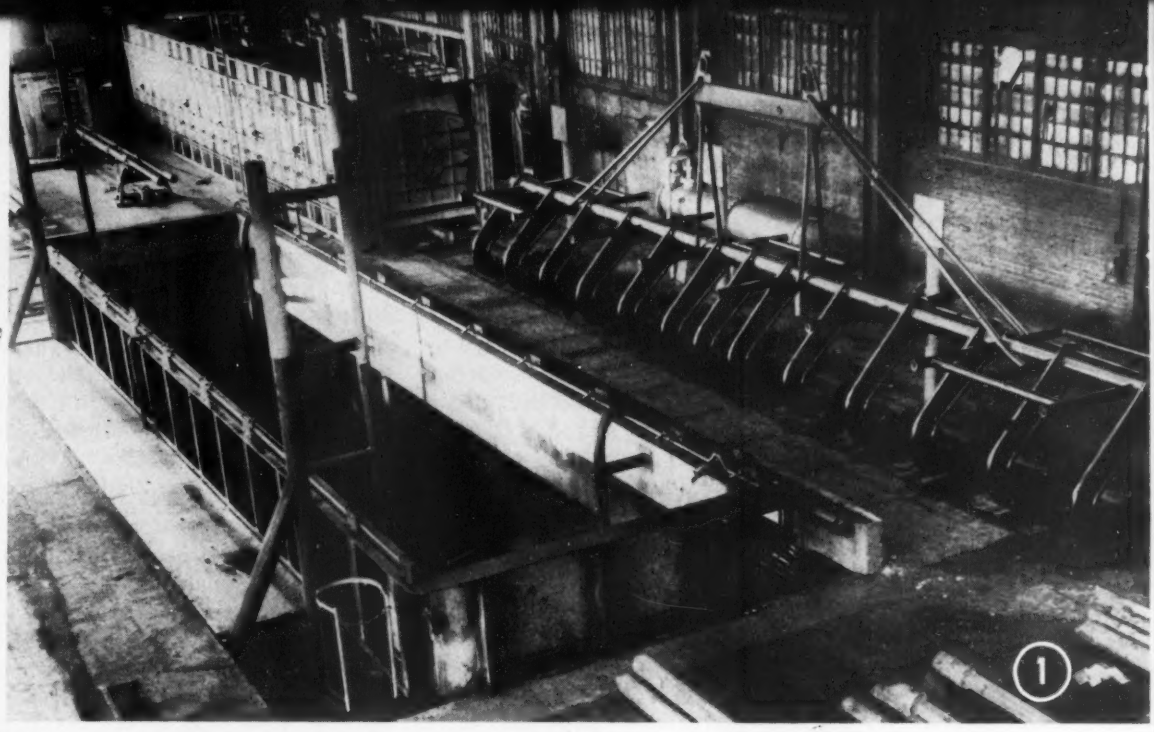


Fig. 1—New heat treating department showing 59-foot oil quenching tank, 64-foot furnace and a specially-designed fork for handling bars up to 54 feet long

Heat Treating 54-FOOT ALLOY BARS

By F. H. BREMMER
Combustion Engineer
Spang-Chalfant Division
National Supply Co.
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Marked improvement in straightness, substantial reduction in straightening costs, fewer reruns and higher quality product are some of the benefits derived from installation of new equipment for handling exceptionally long bars for drill collars

NEW equipment for heat treating alloy bars up to 54 feet long before fabrication into drill collars recently installed is successfully operating at the Ambridge, Pa., plant of the Spang-Chalfant Division of National Supply Co., Pittsburgh. This oil quenching and tempering equipment is designed to produce bars of uniform hardness and requiring the minimum amount of cold straightening after the heat treating.

Drill collars are long, heavy walled tubes used in rotary drilling operations just above the bit. Their function is to provide weight on the rotary bit. The drill collar is loaded as a column while rotating about its own axis and must remain straight during service.

Production of 54-foot drill collars required installation of (1) a 64-foot car bottom furnace, (2) a 40,000-gallon oil quench tank 59 feet long with twenty-six electric motor driven propellers for agitating the oil, and (3) a special 6-ton handling fork for an overhead crane capable of lifting 20 tons of bars.

Principal problem solved by this heat-treating equipment is the minimizing of distortion during the quenching operation. This is accomplished partially by uniformly agitated oil quench and the method of supporting bars during treatment, and partially by tempering immediately after quenching without permitting complete cooling. Improvement in heat treating control and procedure also (1) gives more uniformity of hardness and mechanical properties, (2) prevents abnormal stresses and minimizes cracking, (3) improves machinability because free ferrite is reduced, and (4) removes scale from quenched bars more thoroughly.

It is believed that the bar most apt to stay straight during machining operations and during service is one which was straight in the heat treated condition and which required a minimum of cold straightening. The alloy supports on the furnace car were designed so that the round bars rest in deep V notches. Consequently, the long rounds, uniformly heated and soaked at the quench temperature, remain straight. In fact, slightly crooked bars when properly placed in the V notches align themselves when heated to the tempering temperature.

Straight heated bars must be kept straight during quenching. This is the reason for the elaborate han-

dling fork. Again the bars rest in the V notches and are held straight while removing from the car bottom into the quenching tank. The agitation in the quenching bath was designed for uniform quenching so that the bars would cool as uniformly as possible, thereby minimizing internal stress and allowing a straighter bar.

Rolled Drill Collars—National Supply Co. rolls bars for drill collars from SAE 4140 steel, which is a chromium-molybdenum steel made by the basic open hearth process. The melting and ingot practices are identical with that used in producing seamless tubes and pipe. Although drill collars have been forged for a number of years, the experience of World War II proved that equivalent quality can be obtained in rolled steel for such vital equipment as large guns when the steel is properly heat treated.

Although the company formerly used forged bars for drill collars, rolled bars have the advantage of uniform working from end to end at a uniform rolling temperature. Rolling is a more economical method than forging for large production, but since forging equipment is much cheaper than rolling equipment, the latter cannot be justified unless production is very large.

Since ordinary hot-rolled steel is too soft for the required service conditions, especially at the joint ends, heat treatment is necessary in obtaining a satisfactory combination of strength and ductility. The recommended heat treatment includes an overall quench followed by tempering. It is believed that oil quenching is the optimum heat treatment to develop the best physical properties of the steel.

Bars from 5 to 9⅝-inches in diameter and from 30 to 54 feet long are rolled in mills at Ambridge, Pa. After being roughly straightened in a gag press they are placed on a positioning table with V notches 12 inches apart. These notches match those on the handling fork and on the 36 high-alloy bucks on the furnace car. These supports are spaced to admit the fingers of the fork when transferring bars to or from them by overhead crane.

After heating the bars in the furnace, the car is withdrawn and the crane transfers the charge to the quenching tank. Guides and supporting frame in the tank put the charge in proper position in relation to propellers that agitate the oil. After a predetermined time in the tank, the crane and fork transfer the charge to the furnace car for temper treatment. The elapsed time is ample for cooling the furnace to tempering temperature.

Furnace — The car bottom furnace was designed and built by the George J. Hagan Co., Pittsburgh. It is 64 feet 4½-inches long, 11 feet wide and 11¾ feet high. The furnace car deck is 6 feet wide and carries the 36 bucks to support five bars. Bucks are 8½-inches high and are spaced 18 inches between centers. The furnace car is driven by a constant speed motor through rack and pinion. Automatic limit switches stop the car at both "in" and "out" positions, and furnace door movements are synchronized with car movements so that operators need only close starting switches at a central point to charge and discharge the furnace.

Furnace is fired with 76 North American low pressure natural gas burners, underfired burners providing two-thirds and overfired burners one-third of the total burner capacity. By utilizing both sets of burners for the hardening treatment and only the top set for tempering treatment, the burners are always operated in their most efficient range. The burners are in staggered relationship on opposite sides of the furnace and each is complete with gas pilot. Flues with intake ports at (*Please turn to Page* 101)

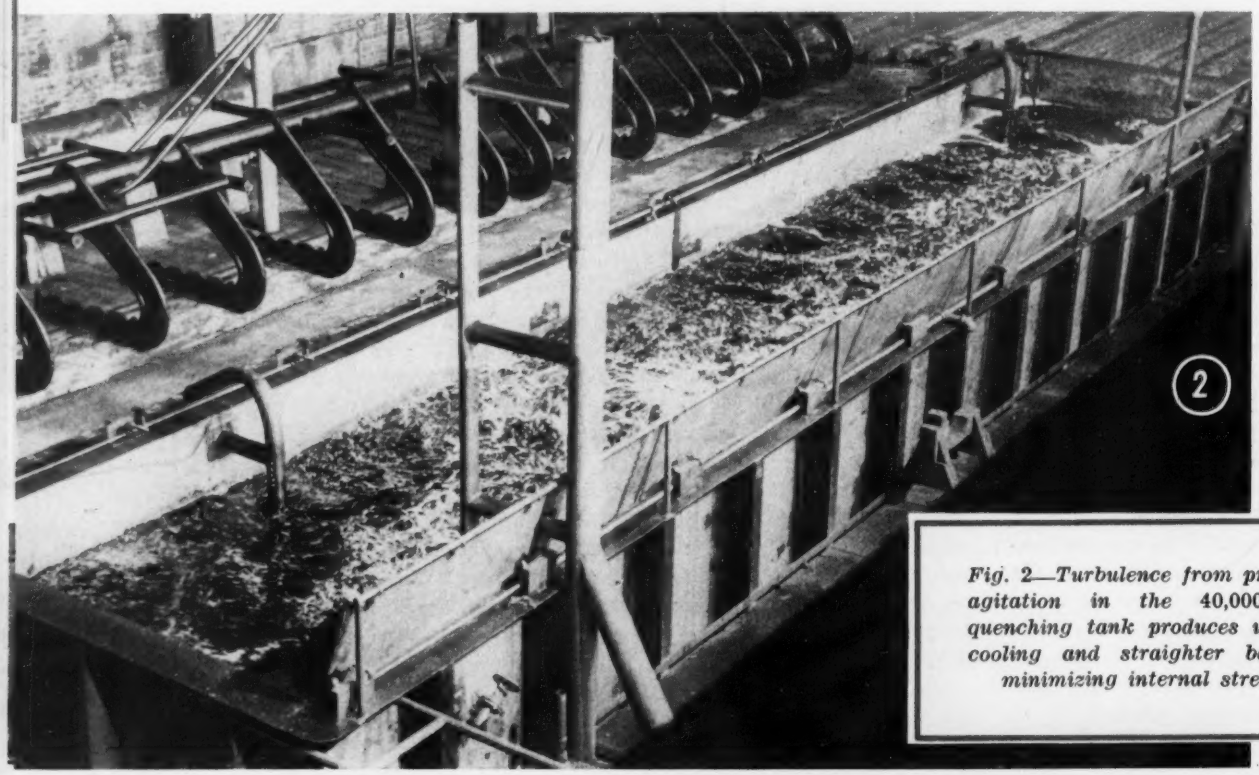

Fig. 2—Turbulence from propeller agitation in the 40,000-gallon quenching tank produces uniform cooling and straighter bars by minimizing internal stresses

Recent studies of the behavior of GA Meehanite metal indicate a definite increase in fatigue life at stresses above the endurance limit

Shot Peening Castings

By DR. C. R. AUSTIN
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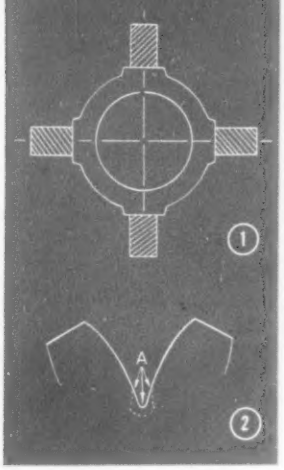


Fig. 1 — Cracking in casting due to grinding. Cracks developed on shaded surfaces

Fig. 2 — Cracking in gears from tensile stresses induced by grinding at A. Undercut design shown by dotted line to avoid contact with grinding wheel

USE of peening as a means of strengthening metal has long been used in the qualitative sense. In the past few years many investigations have been carried out on the quantitative effect of such surface treatment on the behavior of metals, particularly steel, subjected to simple bending and to complex bending stresses.

Development work has been directed toward changing the process from an art to a closely defined mechanical process or science whereby a surface prepared in a specific manner, under controlled and reproducible conditions, could be expected to function in a specific manner in terms of service life where the part was subjected to known conditions of stress.

It is well known that few metal failures occur as the result of compressive stresses and that service failure nearly always results from tensile stresses. Accordingly, for failure to occur in peened service parts in which the surface has been placed under compressive strain, these compressive stresses must first be nullified and then built up in tensile stress to the normal yield or tensile strength of the metal before failure occurs. This is clearly tantamount to increasing the tensile stress which the metal can sustain by an amount equal to the compressive stresses imparted by peening.

Operations such as grinding or heat treatment may actually promote tensile stresses in the surface of metal castings or forgings. This reaction is the antithesis of penning and may actually lead to failure (usually due to tensile stresses) at a stress load less than that which would result in failure in the untreated metal.

Examples of Metal Failure—Many examples of premature failure resulting from treatments developing surface tensile stress prior to putting into service operation, may be cited. Reference to a few of these will aid in establishing the signifiance of such facts to the engineer.

Cracking of Castings Due to Grinding—It has been common practice to assign the reason for failure to faulty design, material or heat treatment. Fig. 1 illustrates a casting in which cracks developed in regions indicated by the shaded areas. Examination of the steps in manufacture showed that these areas had been carelessly ground, and that the surface of the casting was heated due to dulling (loading) of the grinding wheel.

As the outer surface of the metal is heated, it tends to expand. This expansion is prevented by the rigidity of the under surface metals so that the surface layer plastically deforms under the acting compressive stresses. On cooling it then contracts and is subject to outer fiber surface tensile stresses which may even exceed the tensile strength of the metal so that cracking results. The seriousness of even minute surface cracking is dependent on the well known localization of stress, at surface imperfections, which occurs on tensile loading.

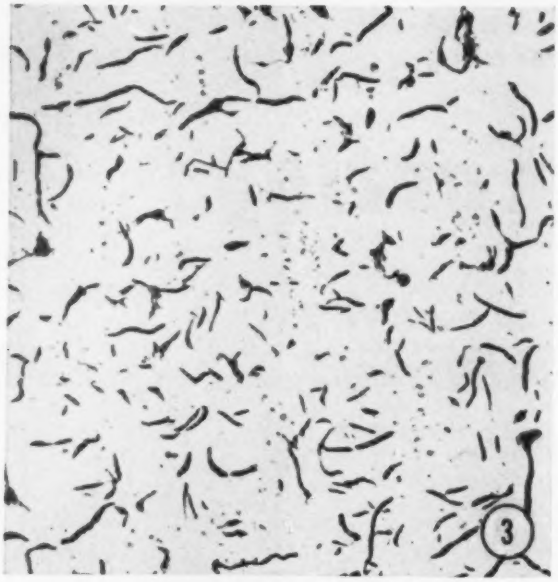
The above comment indicates one reason for recommending that the rim and not the flat of a grinding wheel should be used for grinding surfaces where it is desirable to prevent heat build up in the part.

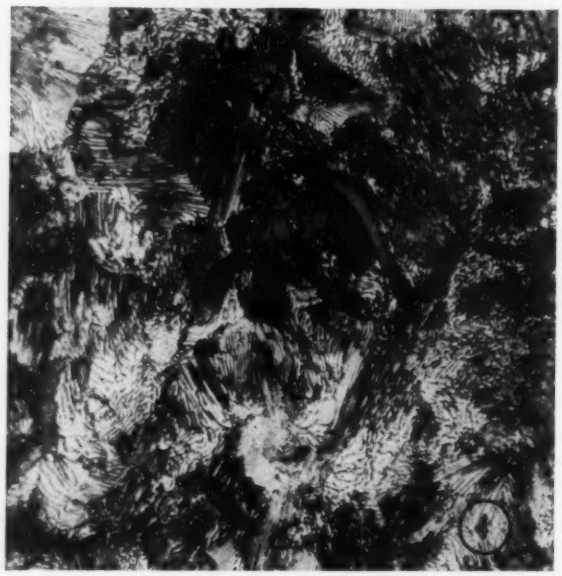
Cracking in Gears Due to Grinding—After a grinding operation, cracking may frequently be observed in gears, particularly in the location marked "A" in Fig. 2. This may be avoided in design by undercutting as shown by the dotted line, so that this portion is not touched by the grinding wheel.

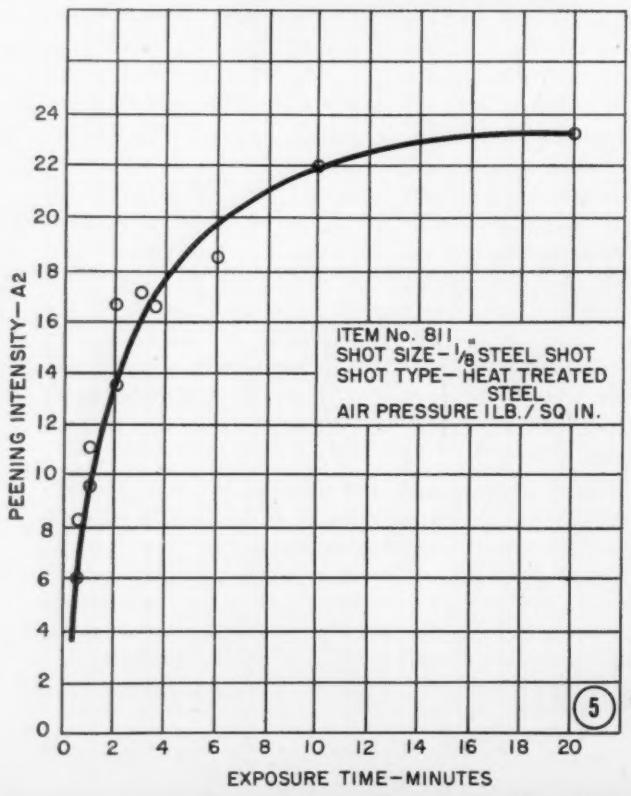
The reason for danger of cracking is similar to that explained in the previously cited example. It is now common practice to nullify any tensile stresses developed after grinding by shot peening or rolling the parts to promote surface compressive stresses.

Cracking Resulting in Hardening by Heat Treatment—On quenching a high carbon material the surface cools rapidly and shrinks. This shrinkage of the outer fibers results in the development of high compressive stresses in the still hot interior, which plastically deforms and shrinks while hot. As this interior cools, further shrinkage tends to take place and since this contraction is restricted by the cool rigid outer surface layers, tensile stresses are developed in the unhardened core which are, of course, balanced by the compressive stresses locked up in the surface layers.

With a heavy core, the tensile stresses are distributed over a large cross section whereas with a thin unhardened core the high tensile stresses operating on a small section, needed to balance the compressive stresses over a heavy section in compression may well exceed the tensile strength of the metal and result in internal cracking. These concepts may be important in the hardening of gear teeth and par-







ticularly when related to problems involving flame hardening.

For a similar reason as outlined above, certain cold freeze treatments have been claimed to promote incipient cracking and hence fatigue failure at low stresses, when the operation has been conducted without regard to the nature of the stresses set up in the treated part.

These examples should suffice to illustrate the newer thoughts on the role of the development of surface compressive stresses on engineering parts for the purpose of increasing normal service life by the addition of such compressive stresses to either material initially free from strain or to material in which initial tensile strains are present in the surface as a result of casting technique, machining, grinding or heat treating operations.

Instances which emphasize the importance of surface hardening by rolling or shot peening to develop compressive stresses include:

1. Rolling of threads on stud bolts. Precision machining has been found much less satisfactory in regard to service life of steel parts and grinding has presented many problems of surface cracking.

2. Rolling fillets on crankpin of a crankshaft has received attention. Method of procedure has been to utilize a wheel where the width of the peripheral section was progressively changing in cam fashion. This permitted the wheel to be rolled in and out of the fillet as the crankshaft revolved in a lathe.

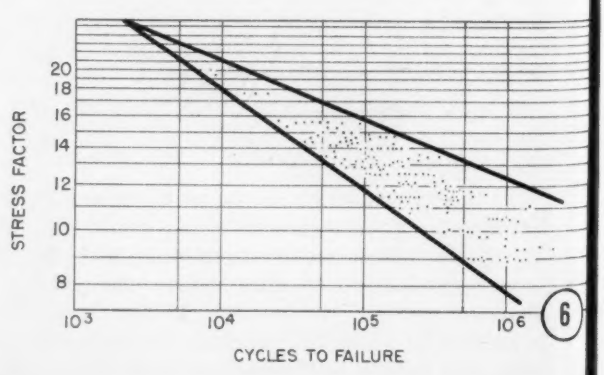
3. Rolling of a threaded section after machining. A shot peening operation may also be used for the purpose of developing surface compressive stresses.

4. Formation of transverse fissures in rails may be noted as an example where surface work hardening with resultant compressive stresses has developed to such a degree (or depth) that the resultant compensating tensile stresses in the limited core section exceeded the tensile strength of the steel. The formation

Fig. 3—Typical cast structure of GA Meehanite metal showing graphite flakes. Unetched X100

Fig. 4—Typical cast structure of GA Meehanite metal showing fine pearlitic matrix after etching in picric acid solution. X600

Fig. 5—Peening intensity curve obtained on the Almen "A" test from shot blast conditions used



of internal cracks or fissures results.

Shot Peening—Shot peening is a cold-working method accomplished by pelting the surface of a metal part with round metallic shot at a relatively high velocity. Its main purpose is to induce compressive stresses in the surface layer of the treated part, for the reasons explained and illustrated earlier in this paper, and hence to increase life of such part under given conditions of operating stresses or to permit increases of such operating stresses while maintaining the service life of the part.

Process of shot peening requires control just as other metal treating processes, and it is necessary to define some of the terms involved in shot peening and to indicate their significance.

Potential peening intensity is governed by the velocity and hardness of the shot and by the size and weight of the individual pellets used. It is an instantaneous characteristic of a blast of shot and hence independent of duration of blast.

Effective peening intensity deals with the effectiveness of a blast of shot on the work being peened and is dependent on the potential peening intensity of the blast and on the angle of impact of the shot on the work. It is measured as arc height at full coverage.

Angle of impact is self explanatory. It has been found that the effective peening intensity varies directly as the sine of the angle of impact. Thus, when the shot strikes the work at right angles, the effective peening intensity is equal to the potential peening intensity.

Arc height is measured by the curvature of a test strip which has been peened on one side only, in accordance with the Almen test procedure. This method depends on the fact that when a thin strip of metal is blasted on one surface the stretching of the surface fibers causes the strip to assume a curved shape. The amount of the curvature is related to the effective intensity of peening and all details of test sample and method of measurement are standardized according to a definite specification.

Coverage is the relation between arc height and time of exposure to a peening blast.

Effect of Shot Peening on "GA" Meehanite Metal—For this study, castings were made by Continental Gin Co., Birmingham, Ala. and tests were conducted by Cooper-Bessemer Corp., Mt. Vernon, O., to whom we are much indebted. The peening operation was conducted under the direction of J. O. Almen, head of mechanical engineering department, General Motors Corp., Detroit, who has been a leading exponent in the development and application of shot peening methods.

Mechanical characteristics of the type "GA" Meehanite metal used in the fatigue tests were as follows: Tests made on standard cast 1.2-inch diameter arbitration bars:

Transverse Strength ..... 3297 pounds
Deflection 0.292-inch

Tests made on 0.505-inch diameter gage tensile bar machined from cast fatigue bar.

Tensile Strength ..... 61,000 pounds per square inch

Metallurgical characteristics of this engineering type Meehanite metal as revealed by the microstructure are reproduced in Figs. 3 and 4. Fig. 3 shows the size and distribution of the graphite flake as seen in the polished unetched section at 100 diameters magnification. The control of both the size of the flake as well as its uniform discontinuous distribution is a most important feature of these irons. Equally important is the fine pearlitic structure which forms the matrix as shown in Fig. 4 at 600 diameters magnification.

Details of Shot Peening—The shot peening data furnished to indicate the method of peening was as follows:

Shot: Heat treated steel balls ¼-inch diameter
Shot flow rate: 12 pounds per minute
Rotational speed of specimens: 245 revolutions per minute
Axial movement of specimens: 8.5 inches
Peening time for specimens: 25 minutes
Peening intensity: See Fig. 5.

The peening intensity curve was obtained by moving Almen "A" test strips under the blast by hand. The peening time for the fatigue specimens was then determined by visual examination of the fatigue specimens under a microscope.

Results of Tests—Bars were tested on a 10,000 inch-pounds rotating beam fatigue testing machine made by the Baldwin Locomotive Works, Philadelphia. Results of test on the bars cast to form and machined to a good surface finish are shown in Table I.

Endurance limit obtained on these tests was therefore 28,000 pounds per square inch. Since the tensile

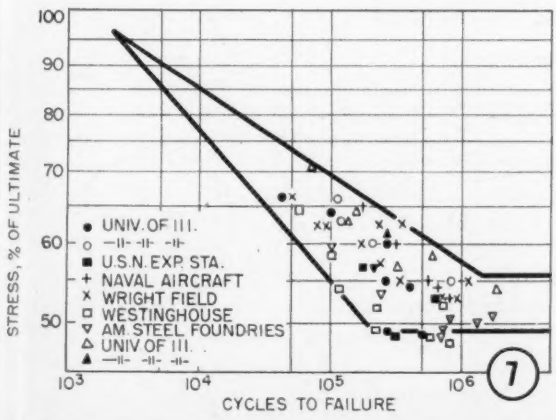
TABLE I

TESTED AS CAST

Stress P.S.I.	Number of Revolutions	Remarks
30,000	1,599,000	Broke
29,000	190,000	Broke
28,500	847,000	Broke
28,250	476,000	Broke
28,000	10,167,000	Unbroken
26,000	14,252,000	Unbroken
20,000	10,206,000	Unbroken

Fig. 6—Tests to destruction on rear axles for automobiles (Almen and Boegehold)

Fig. 7—Plot to show scatter of results at loads above endurance limit on SAE 4340 steel



strength of the "GA" Meehanite castings was about 61,000 pounds per square inch, the ratio of endurance limit to tensile strength is 0.46.

A second series of tests conducted on test bars machined to size and peened according to the procedure previously outlined gave the results indicated in Table II. This again gives the endurance limit of 28,000 pounds per square inch and endurance ratio of 0.46.

It may be deduced from the results that shot peening has little effect on the endurance limit of "GA" Meehanite metal when the iron is subjected to load under reversed bending stresses during rotation of the member. It is unwise, however, to assume that similar surface peening would produce a similar result when either test or service operation did not involve repeated stress reversal under conditions of rotation.

Much of the published data on the value of shot peening has been directed to increase in fatigue life of a part rather than to raising the endurance limit of the metal. It is well known that considerable scatter of data may be expected from fabricated steel parts when tested in fatigue at stresses greater than this so-called endurance limit and it is in this field that the demonstration of the effectiveness of shot peening has been most clearly established. In the few instances where data from the number of tests is run at sufficiently large load differences on forged steel parts, it is found that the scatter of the test points when plotted on logarithmic co-ordinates falls within a well defined pattern.

Fig. 6 illustrates this scatter obtained from about 200 tests, reported by Almen and Boegehold, on automobile and truck rear axles. Fig. 7 shows the data scatter obtained by the research committee on Fatigue of Metals ASTM from several laboratories which conducted independent tests on identical material (SAE 4340) under similar test conditions.

TABLE II
TESTED AFTER PEENING

Stress P.S.I.	Number of Revolutions	Remarks
30,000	8,489,000	Broke
29,000	7,962,000	Broke
28,500	20,742,000	Broke
28,250	10,962,000	Broke
28,000	25,008,000	Unbroken

Points on these figures fall within a well defined pattern. Pattern tends to radiate from a point at high stress and a low number of stress cycles and to diverge to a broad band at low stress and high number of cycles. Point at high stress would be approximate to the tensile strength of the metal for brittle materials and would be found near one cycle of stress. For ductile materials, the region of intersection would probably be at a number of stress cycles at a load less than the tensile strength on account of the ductility of the material permitting stress adjustment through yield.

These diagrams illustrate the need for recognition of a "life span" or fatigue life of metals subjected to repeated bending stresses above the endurance limit. Such stresses are now normally used in design where parts are not intended for indefinite service but must have reasonable assurance that failure will not occur within the known required life of the part. This aspect has significance in such engineering design where dimensions are calculated for stress less than the endurance limit but where overloads may be anticipated at intermittent periods.

Much of the effectiveness of shot peening has been revealed in engineering parts which are subjected to simple bending stresses. To quote from J. O. Almen who defined the peening conditions for the tests on "GA" Meehanite metal herein reported:

"I do not know what to expect in the way of fatigue behavior of these specimens. You propose to test the specimens in reverse bending under which circumstances the fatigue strength will be different than that which would be obtained under one-direction bending. When loaded in one direction only, the

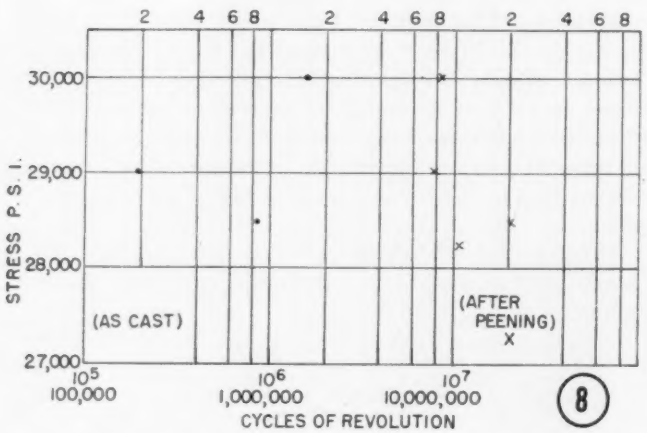


Fig. 8—Effect of shot peening on scatter of data for GA Meehanite metal at loads above endurance limit

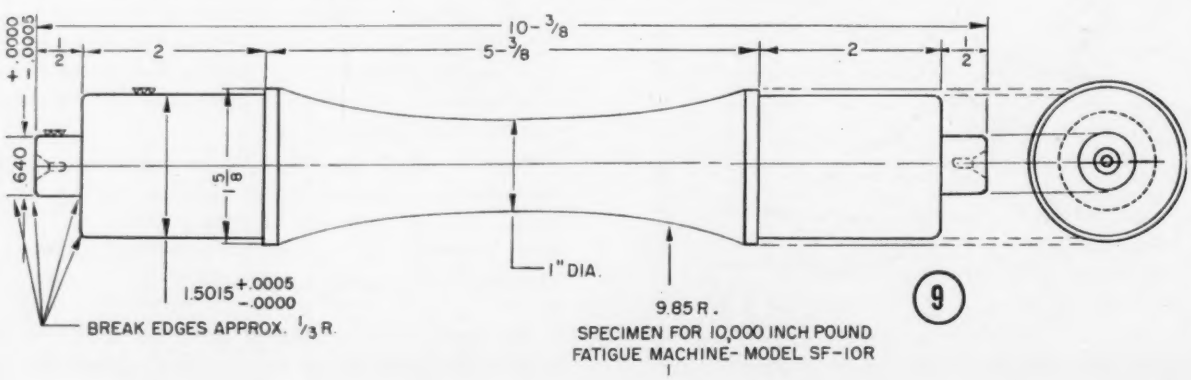
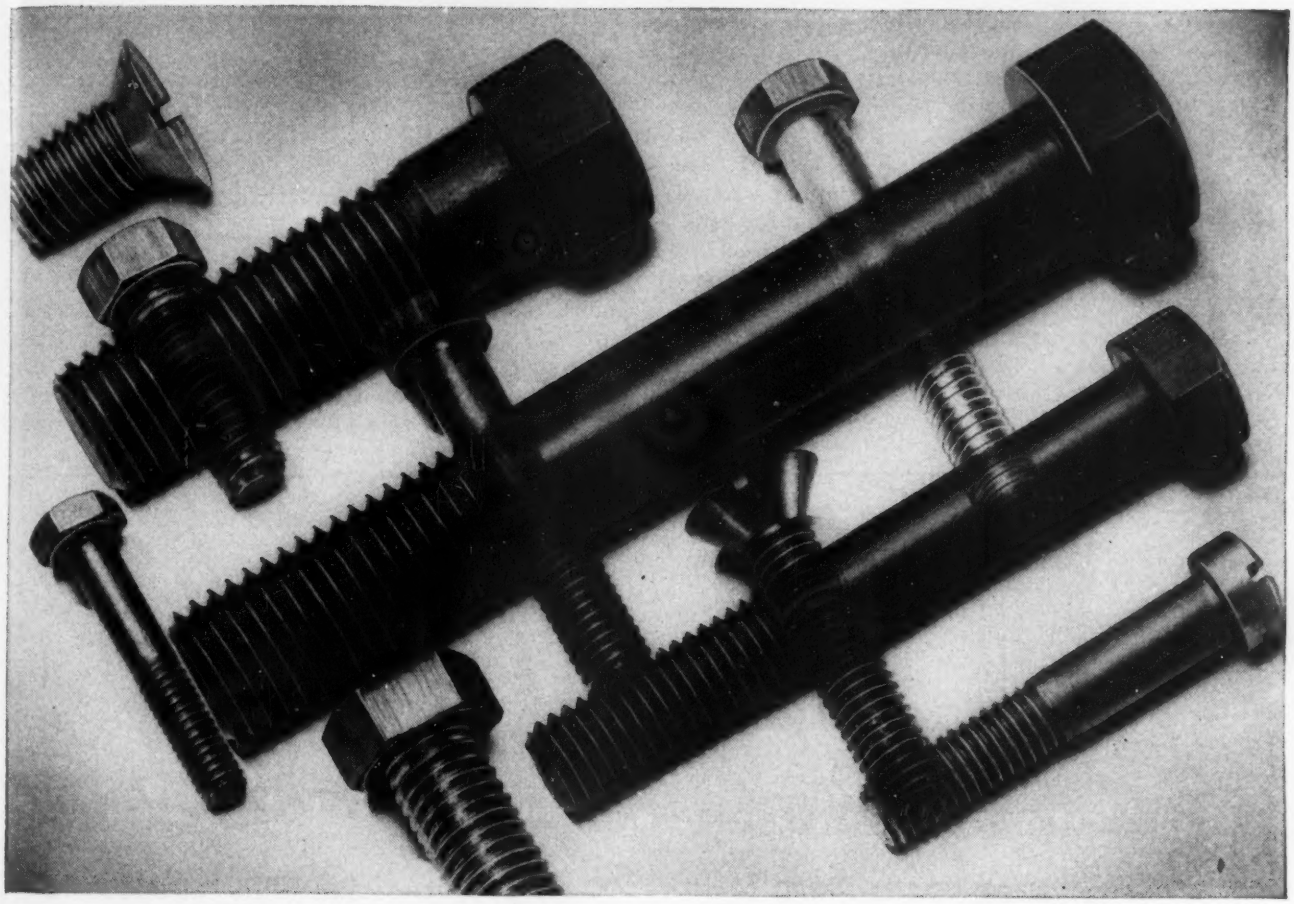


Fig. 9—Test bar machined to size for direct test as cast and for treatment by shot peening prior to test



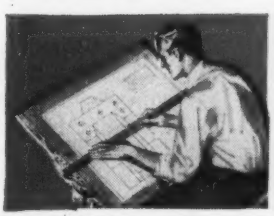
IT'S "t.f.e."

TO FASTEN QUALITY WITH QUALITY

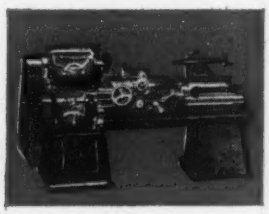
Purpose of a fastener is to fasten. So the cheapest fastener is the one that fastens *best*, with minimum time for assembly, maximum holding power per dollar, and the ultimate contribution to the finished product's appearance.

Manufacturers of machinery and equipment have learned that specifying RB&W Cap Screws saves money all along the line. RB&W's investments in spheroidizing furnaces to improve structure of high carbon and alloy steels . . . mills to draw its own wire to closest tolerances . . . atmospheric-controlled furnaces for scientific heat treatment . . . are as important as the modern production machines in contributing to *T*rue *F*astener *E*conomy.

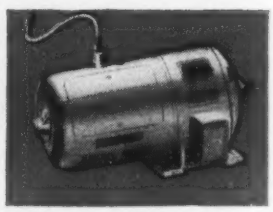
On *any* problem involving bolts, nuts, screws, rivets or specials, RB&W engineers will help you attain *T*rue *F*astener *E*conomy.



DESIGNING FOR T.F.E. Correct use of RB&W Cap Screws often permits reduction in number and size of holes, saving time and increasing strength of assembly.



CAP SCREWS FOR SEVERE SERVICE. Uniformly high strength, maximum toughness and adherence to close tolerances equip RB&W Cap Screws for severe stress conditions.



SUPERIOR APPEARANCE. The superior finish of RB&W Cap Screws enhances the appearance of the assembly and contributes to the sales value of the final product.

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103 Years Making Strong the Things That Make America Strong

specimen will, I believe, show much greater benefit from the shot peening operation than under the test procedure proposed."

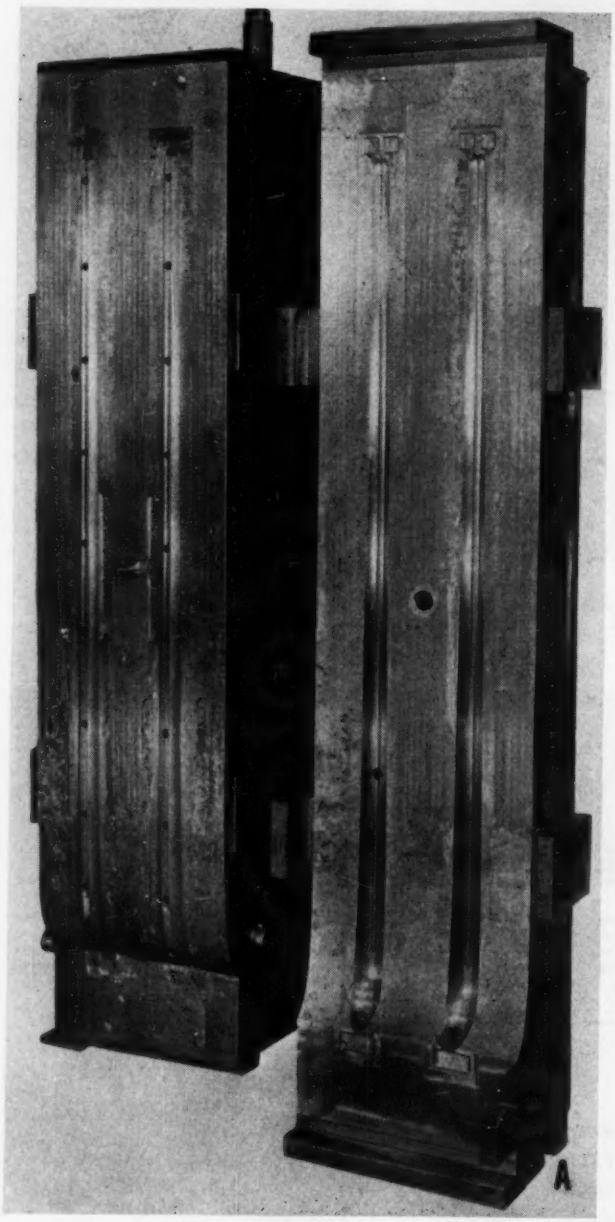
Unfortunately, insufficient data are available to examine this phase of the effect of shot peening on "GA" Meehanite metal but a displacement of data toward increased fatigue life as a result of surface peening is shown in the comparison found in Table III. Displacement of the data to longer fatigue life as a result of peening is evident from the data shown plotted in Fig. 8.

Again quoting from J. O. Almen, "You will recall that we have shown very great gains in fatigue durability of cast iron, malleable iron and Armasteel in our own tests, in which the load was one-direction bending. I will expect Meehanite metal to behave in much the same manner under the same loading conditions. Since in most service uses the loads are not reversing, our standard fatigue procedures are not capable of giving us a fair estimate of the worth of a material as these materials are used in practice."

TABLE III

DISPLACEMENT OF DATA TOWARD INCREASED FATIGUE LIFE AS A RESULT OF SURFACE PEENING

Stress P.S.I.	Number of Revolutions		Remarks
	As Cast	As Peened	
30,000	1,599,000	8,489,000	Broke
29,000	190,000	7,962,000	Broke
28,500	847,000	20,742,000	Broke
28,250	476,000	10,962,000	Broke
28,000	10,167,000	25,008,000	Unbroken



80-inch DIE CASTING DIE

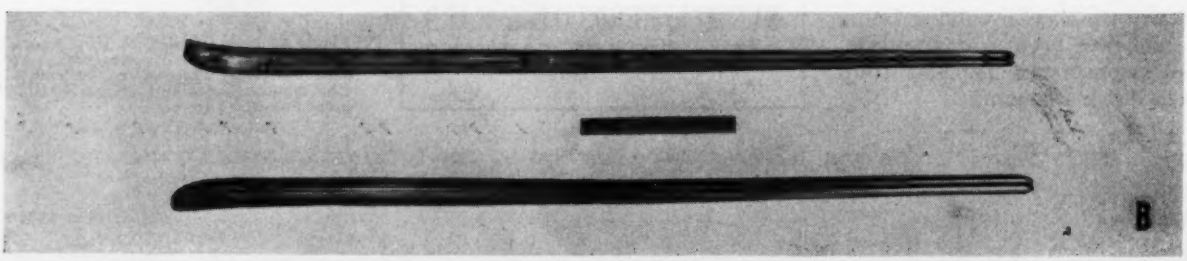
. . . produces zinc alloy automobile strip

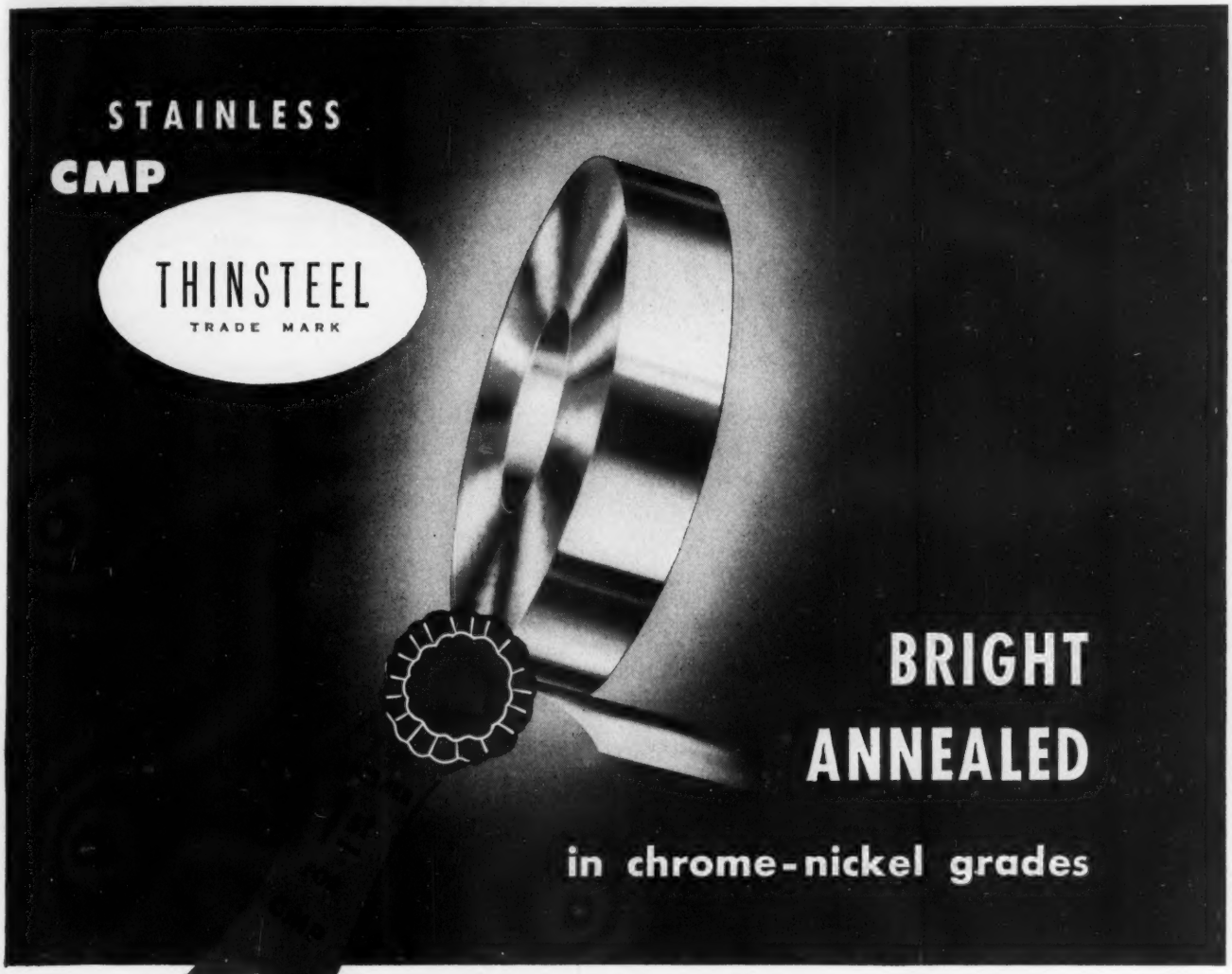
BUILT to produce hundreds of thousands of zinc alloy automobile molding strip or fender ornament castings, a new 80-inch long special alloy steel die casting die was recently placed in service at Gerity-Michigan Corp.'s plant in Detroit. According to company engineers, the 10,000-pound die is the longest ever constructed for this type of work.

Other dimensions are 18 inches wide by 32 inches shut height. Latter designation refers to the die closed in the machine, ready for the metal to be injected or "shot" into its cavities. As can be seen in the accompanying photograph, the die is built in two parts, comprising front or cover half and back or ejector half; it has two cavities, one each for the right and left hand parts.

Steel used in its construction is CSM No. 2 die casting die steel made by Crucible Steel Co. of America, New York. This is an electric furnace alloy prehardened to between 275 and 310 brinell. Chemical analysis is: Carbon—0.30, manganese—0.75, silicon—0.50, chromium—0.80, molybdenum—0.25 per cent.

The part or molding cast in this equipment weights 2¾ pounds, is 65-19/64 inches long, with an average wall or section thickness of 0.070-inch. Production on the molding started in December, 1947.





NOW you can reduce finishing and polishing costs

Heretofore such a high finish, common to annealed straight chromium grades of type 430 stainless, could only be obtained on annealed chrome-nickel grades like type 302 by polishing the strip or fabricated product as a last operation. *NOW*—CMP 18-8 stainless Thinsteel can be furnished in annealed temper with a bright lustrous finish. To users of light gauge chrome-nickel stainless strip steel, the opportunities for reduction in finishing and polishing costs will be readily apparent. This is a NEW product and NEW applications for it are now being developed. We will welcome the opportunity to demonstrate how CMP Stainless Thinsteel can enhance the beauty and utility of stainless strip products while reducing the cost of the finished product.

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Powder Metallurgy

. . . affords high production of quality machine parts

GUARANTEED mass production of more homogeneous bearings and machine parts, both chemically and physically with the absolute elimination of scrap, and noted absence of blow-holes, hard spots and similar difficulties is being afforded the manufacturer by use of today's powder metallurgy processes, it was pointed out in the recent fourth annual powder metallurgy lecture at Stevens Institute, Hoboken, N. J. delivered by Anthony J. Langhammer. Management must be fully cognizant of the new processes and willing to appropriate necessary investment for procurement of plant and equipment in anticipation of actual orders. The recent war brought home the fact that powder metallurgy enabled quicker tooling-up with resultant higher production.

The speaker, an "old-timer" in the automotive industry, is president of the Amplex Division of Chrysler Corp., Detroit, which pioneered in the use of powder metallurgy in the automotive field. He was presented the medal awarded annually by Stevens for outstanding achievement in the field of powder metallurgy.

Mr. Langhammer went on to say; "In the latter twenties, and because of apparent potentialities of powder metallurgy, pressure was exercised for a heavy duty self-lubricating bearing. Chrysler engineers tackled the problem and, following development of Oilite, established the Amplex Division for its manufacture. First application was the clutch pilot bearing, a unit that is inaccessible after assembly being located in the crankshaft flange. Bearing cost was about 5 cents, but cost of lubricating it was $3.50, the operation having to be repeated frequently while the car was out of service. Oilite, the oil-cushion, self-lubricating bearing, provided trouble free performance for car life without any subsequent lubrication.

"The engine water pump was a kindred problem except that here was a heavy load due to the cooling fan with a fairly high speed application. For a 6-cylinder engine of medium size, driving the fan at 4000 revolutions per minute requires 6-horsepower to which is added the load of the water pump. Here, too, the new bearing was the answer.

"As with oil cushion bearings, the first machine parts were relatively small and simple in design. They were chosen for powder metallurgy because a specific property otherwise unobtainable was desired. One of the first was a gib where lubrication and cleanliness was difficult to maintain.

"Next came production of machine parts involving multiple and complicated machining operations such as profiling and depressing. Another group consisted of parts where the material used was unsatisfactory from the standpoint of strength and/or wearing qualities.

"Then came demand for larger units in both bearings and machine parts, also more complicated design for both. Through the co-operation of bearings and parts manufacturers with the builders of press equipment, the press capacity in tonnage was increased from 45 to 150, 350, 1000, and to more than 2000 tons. These huge presses had to be designed and built for the production of thrust bearings, large diameter bearings, also large bearings and parts of appreciable length with respect to the diameter. Because much time is required to design and build these large presses, requirements must be anticipated ahead of actual orders.

"The adaptability of oil cushion bearings and parts to mass production methods also early played an important part in their recognition and use.

"Friction members for clutches and brakes, also filters for controlling liquids and gases have made good progress. Advantages afforded include compactness, longer life, heat dissipation, also coefficients of friction and wear factors covering a broad range. Filters are sturdy, calibrated, economical, applicable to liquids and gases, and highly non-corrosive.

"On certain machine parts of complex design, it was not unusual to be in production on a powdered metal part within six weeks, as compared to 18 month delivery on machinery and tools for normal manufacturing methods. Strategic metals were conserved by substitution of ferrous materials for copper and tin, and further savings were provided through the elimination of chips and scrap when strategic materials were used in the manufacture of powder metal parts.

"Basic requirements of new and ultra-modern equipment include high velocity, materials that will withstand higher temperatures, and decreased weight.

"Decreased bearing clearances make for longer life, assembly of greater precision, and quiet operation. Unequaled in any other product is the facility for sizing an oil-cushion bearing during or after assembly. It makes possible higher factors of safety and more foolproof operations such as is encountered on a bearing that one day is operating in the Sahara Desert and the next day must function in the frozen north of Iceland.

"Tooling programs of today are far more expensive than at any time in our history. Powder metallurgy can be of great assistance in effecting economies and valuable to corporations engaged in bringing out new or revised designs.

"The manufacture of metal powders, especially iron powders, has broadened appreciably. A number of lower priced iron powders are available.

"From my background as a tool maker, I see one goal—to have metal powders so constant and uniform that a briquetting press may be set up with the speed and continuity employed in setting up automatic machine tools."

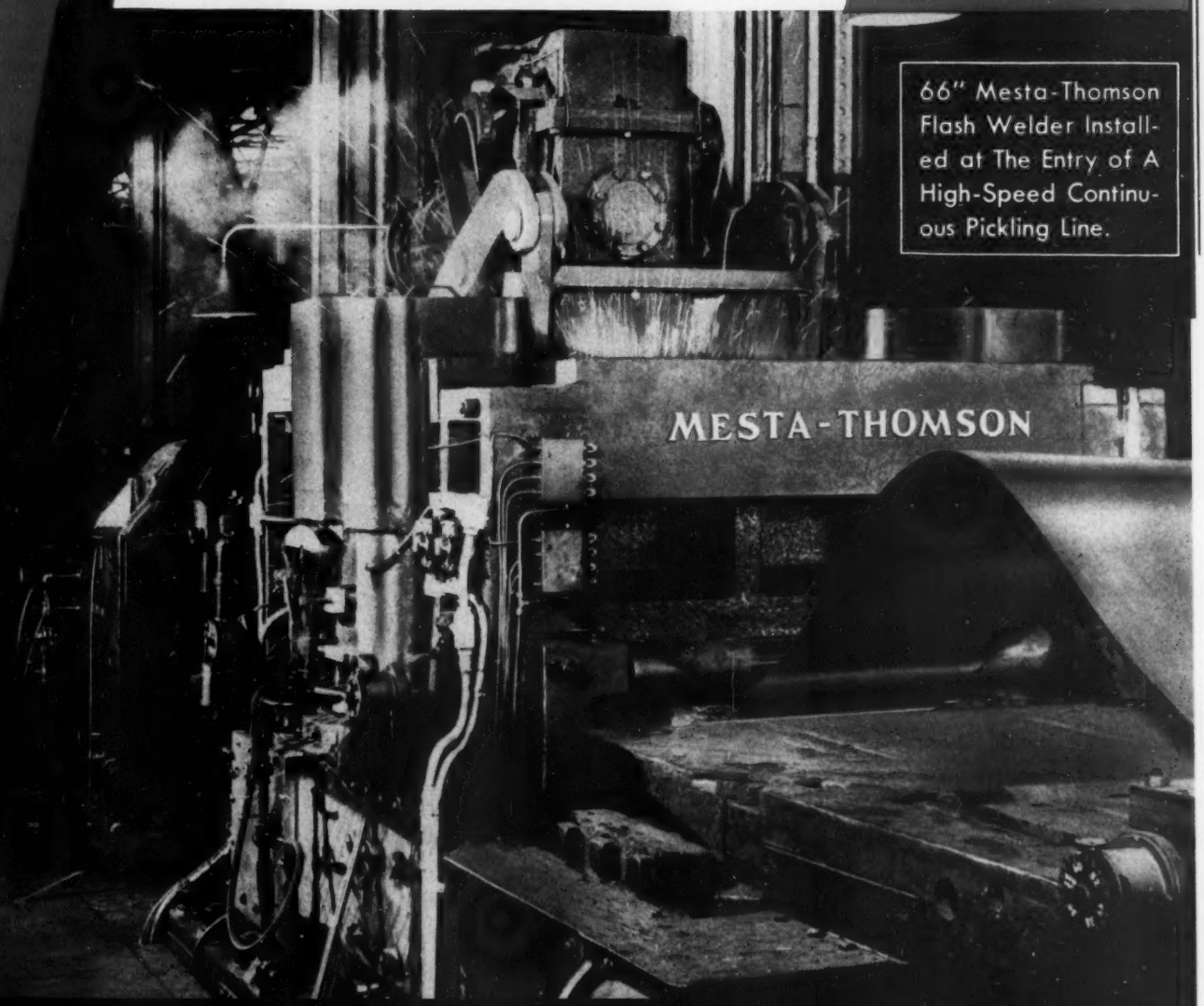
Galvanized Steel Welding Method Protects Plating

Welding galvanized steel without damaging plating has long been a production difficulty. High temperatures of ordinary welding techniques oxidized the zinc coating of the steel and left the area exposed to corrosion.

Recently Eutectic Welding Alloys Corp., New York, discovered that one of its electrodes containing a certain percentage of chromium and a new coating permitted the weld to be deposited at very low heat and great speed in welding galvanized steel. The rod, called Eutectrode 670 for direct current, or 67 for alternating current, eliminated necessity of re-galvanizing the weld to insure complete corrosion resistance.

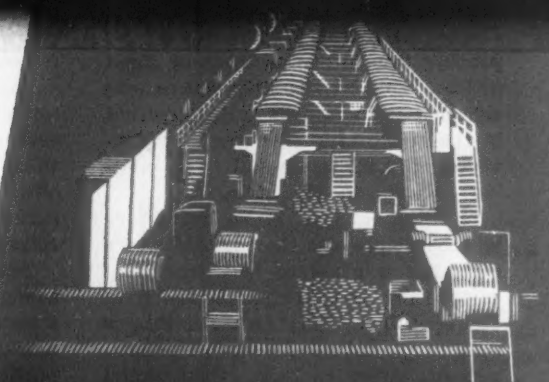
Application of less heat and greater speed of deposit reduce the possibility of distortion and buckling. Lower amperages required and faster welds provided by the rods eliminate dilution and deep penetration of base metal resulting in high strength for base metal and alloy.

Increase Cold Mill Production with MESTA-THOMSON Flash Welders



66" Mesta-Thomson Flash Welder Installed at The Entry of A High-Speed Continuous Pickling Line.

Cold mill production is increased . . . when MESTA-THOMSON FLASH WELDERS are installed in your continuous pickling lines. They provide heavier coils, with butt-welded joints, suitable for cold rolling on today's high speed mills.



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MESTA MACHINE COMPANY • PITTSBURGH, PA.

LETTERS *to the Editors...*

Carbonyl Iron

We are writing to ask whether you could furnish us with some information regarding a product called Carbonyliron, which is said to be a metal powder for electrical purposes for the manufacture of cores for transformers, etc.

We have received a letter from one of our correspondents in The Hague, Holland, asking for this information, but we are unable to trace this product in any of our trade directories that are available. They mention that this product is offered by General Film & Mine Corp., which we are also unable to trace.

James R. Ballantine
Foreign Trade Bureau
The Commercial Museum
Philadelphia, Pa.

None of our reference material shows either this trade name or a company by that name. It is thought that the company is General Aniline & Film Corp., New York, who, according to Moody's Manual of Investments, "produces carbonyl iron powder used in high frequency radio reception and transmission . . . "—The Editors.

Handling of Strip Steel

In your March 3, 1947 issue of "As the Editor Views the News" you refer to an article covering the handling of steel bar stock as received by motor truck.

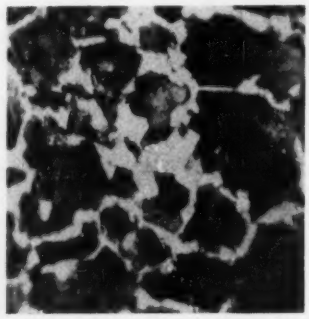
Will you please advise if you have any information on the handling of strip steel as received in bundles and also subsequently the handling of the individual stacks of strips comprising the bundles.

R. W. Breckenridge
Automatic Die & Products Co.
Maple Heights, O.

Elusive Character

The attached photomicrograph of 1045 steel, X300, should silence for all time those skeptics who refuse to acknowledge the activities of gremlins in the steel industry.

John M. Doyle, Chief
Metallurgist
Delco-Remy Division
General Motors Corp.
Anderson, Ind.



Want To Melt Lead

In our capacity as distributor for marine storage batteries we are accumulating oil lead/acid batteries at the rate of 20 or 30 tons per month. We are interested in reclaiming the lead from these batteries rather than dispose of them through local junk dealers.

Can you refer us to some manufacturer of equipment for reclaiming this lead and lead oxide on this small scale so that we may determine whether or not it can be done profitably?

Geoffrey Chapman
Chapman Electric Co.
Mobile, Alabama

Production Shortcut

In your December 15 issue of STEEL, page 87, under "Production Shortcut", reference is made to an original report on a special die lubricant used by Germans as a deep drawing lubricant.

We are interested in securing a copy of this document. Would you kindly give us the complete address of the publisher?

C. J. Westwood
Ladish Co.
Cudahy, Wis.

The report mentioned was publicized in Engineering News at a Glance and is designated as PB-81642, "German Practice in Fabrication of Gas Turbine Blades." It is obtainable for 50 cents from Office of Technical Services, Department of Commerce, Washington 25, D. C. Check or money order should be payable to Treasurer of the United States.—The Editors.

On Their Way

Please forward to this arsenal to the attention of the undersigned a reprint of the following article appearing in the Dec. 22, 1947 issue of STEEL: "Selecting Aluminum Alloys for Specific Applications", by Herbert Dobkin.

A. H. Maggs
Watervliet Arsenal
Watervliet, N. Y.

LIFE OF

LADLE AND SPOUT LININGS

Increased with Graphite Base Refractory

SLAG attack has always been a damaging factor in the life of any receptacle in which molten metal must be held for purposes of conveying and pouring into either castings or ingot molds. This particularly severe erosive condition is also quite apparent in the spout or runner used for conveying the molten metal from melting furnace to the ladle.

Naturally, there is no refractory which will prevent the formation of a slag, but a graphite base brick developed by the Graftex Division of McFeely Brick Co., Latrobe, Pa., is said to permit easy removal of slag deposits after cooling. Commercial operating experience with this refractory to date shows that in most instances the slag which forms is considerably less than normally experienced with use of typical clay refractories.

Physical characteristics are uniform throughout the entire graphite base refractory regardless of use or thickness of refractory remaining. In other words, equal protection is assured in use at all times during the refractory life.

This uniformity of composition is achieved by using all modern clay forming equipment, as well as special machinery to assure the proper proportioning, mixing and forming of the ware. The firing or burning of the ware is done in special kilns, developed through research and experimentation. Extreme care is used throughout all the above stages. In addition to careful selection and manufacturing procedure, a plant and laboratory control system that includes both chemical and physical testing, assures a most uniform product.

Various chemical and proportioning formulas are used in the manufacture of this product so as to give the utmost emphasis on the physical properties required by industry. As an example, some installations may require maximum resistance to flaking or spalling resulting from heat shock; resistance to erosion or corrosion; minimum shrinkage or expansion throughout commercial heat range; in others the extreme density or low water absorption may be the dominant quality required.

Such basic features as nonwetting quality, high temperature resistance,

(*Please turn to Page* 115)

Pin Hole DRILLING
Simplified with All-Purpose Jig

By ROBERT MAWSON

ONE of the operations performed in many machine shops is drilling pin holes in parts. Parts may be pins with a shouldered portion, either plain or with a thread, hexagon head bolts, plain or threaded studs and others used when assembling machines or special tools.

In these parts are the operations of drilling holes in various locations. It is evident that if drill jigs were made to comply with all these conditions a plant would have to make an expensive outlay to provide these jigs.

A further disadvantage would be the amount of space required in the tool crib to store the jigs which may be used only occasionally. Rather than design and make these many pin hole drill jigs some plants drill these holes by the lay-out method. This consists of measuring off the correct locations on the piece, marking these positions with a center punch and then drilling the holes and holding the piece on a block during the operations. However, this method cannot be considered the best procedure; it is slow and costly and the accuracy of the holes depends upon the human element. The work, therefore, cannot be called precision manufacturing.

In the illustration is shown a universal drill jig for drilling small holes in studs, bolts, pins, etc. The tool can be used to drill one or several holes in different diameters up to the capacity of the tool as designed. It is made with a cast iron base A provided with four feet which are machined to be in alignment. On the two opposite sides of the base are vertical walls B which are finished at right angles with the feet on the base. The jig casting is made with two surfaces C which extend along the base and almost up to the inside face of the boss projection at the right hand end of the jig. These two surfaces are machined to be in alignment with the feet on the jig base.

Boss projection is bored and counterbored to have a good sliding fit for the piece holding bushings D which are made of machine steel. On the flange of the bushings is cut a slot in which enters the locating pin E. On one side of the bushings is machined a flat F in alignment with the square head set screw G. In each of the bushings is machined a hole in alignment with but slightly larger than the knurled head screw Q. The holes in the bushings are machined to be a good sliding fit for the respective piece used in the bushing.

Bushing holding frame J is made of machine steel and is made to be a good sliding fit between the two sides B of the jig base. On the top surfaces of the sides B are fastened with three fillister head screws machine steel plates K. The bushing holding frame is machined so that it will slide between the two sides and the upper plates.

On the rear plate K is soldered a steel graduated scale in the position shown in the illustration. A machine steel index pointer L is fastened to the holding frame with two flat head machine screws. In the holding frame is accurately located a tool steel lining bushing M. On the forward face of the holding frame is fastened with two flat head machine screws a steel angle N in which is placed a knurled head screw O.

A series of tool steel slip bushings P are provided with the drill jig to fit into the lining bushing. The holes in the slip bushings are made to guide the various drills for machining the holes in the pieces for which the jig is designed.

To use the drill jig, the bushing holding frame is first moved along the ways in the jig until the index

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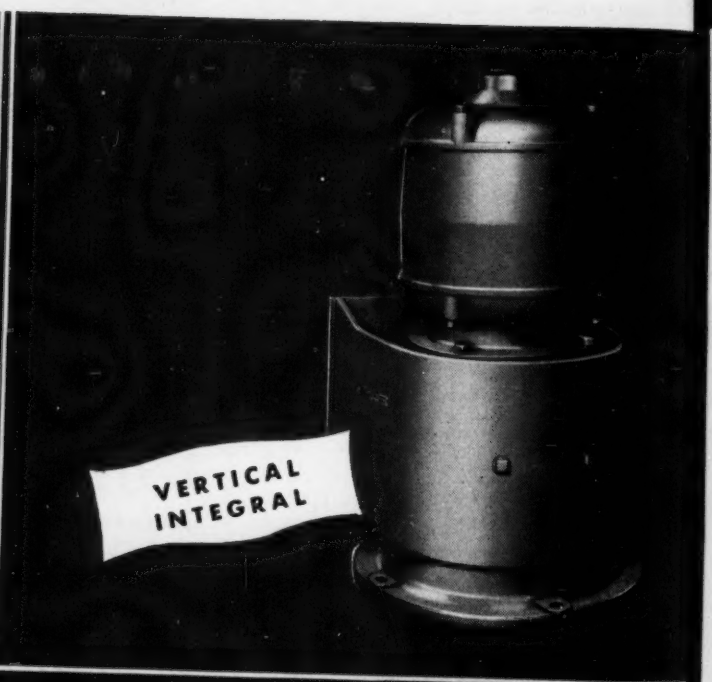

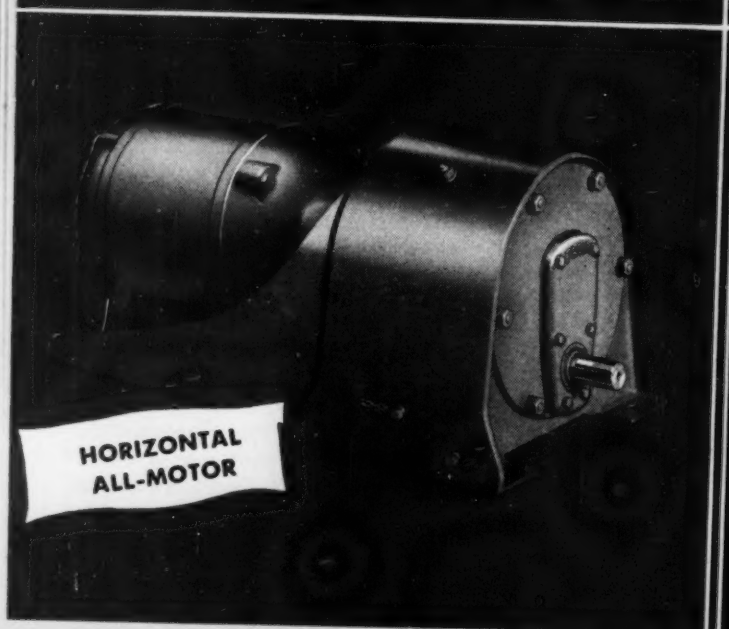

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7. **Improved gearing**—crown shaved, taper-bored helical gears; larger pinions.
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9. **Greater availability**—production increased by new tools and facilities—and by adhering to our basic design for all types.

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The new Falk Motoreducer is stronger . . . more rigid . . . more modern in design . . . better in every way. It is built to stand up longer, make operations surer, operate more quietly and with less maintenance. It retains all the inbuilt qualities that built Falk's unmatched reputation as top builder of Motoreducers—plus new developments, new refinements made possible only through vast experience and tireless devotion to the highest ideals of product design and manufacture.

Shown on these pages are the new horizontal and vertical All-Motor and Integral-type models. Other types for other purposes will be added to the line as fast as production permits. Single reduction, double, triple and quad models—all are available in this sensational new Falk Motoreducer line. Please ask for copy of our latest bulletin which will be mailed to you as soon as it is off the press.

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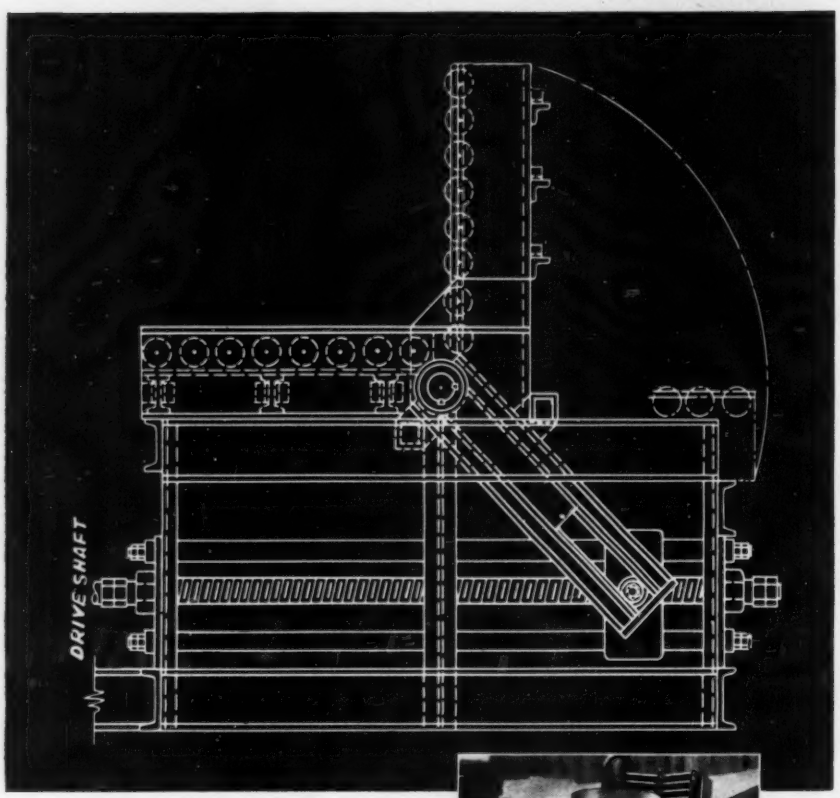
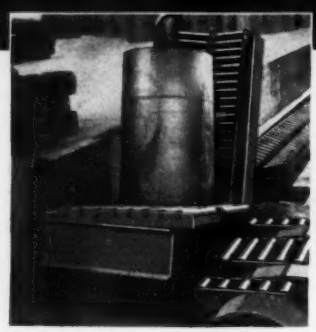
ONLY *Logan* OFFERS THE "SCREW TYPE" UPENDER





With this Logan machine: Adequate reduction is obtained without the use of reducer. Both ends of screw are supported by anti-friction radial and thrust bearings. Small view at right shows actual installation. Screw operating mechanism is located in pit below floor level.

LOGAN offers a better, more skillfully engineered machine than anything else the market affords.

Features include: (a) Positive operation—in case of accidental power failure, carriage automatically locks in any position. (b) Coil travel may be stopped purposely in any position. (c) Massive pivot shaft takes the loading shock when loading or unloading by crane. (d) This "screw type" machine can be adapted readily to lateral discharge. (Logan patented down-tilt, side-tilt.)

Improvements in design have greatly simplified maintenance and added strength to vital parts. Logan also can furnish the conventional gear segment type upender.

SINCE Logan 1876

Logan Conveyors

LOGAN CO., INC., 535 CABEL ST., LOUISVILLE 6, KY.

pointer registers the desired position, as shown on the graduated scale. If the piece has a shoulder the distance will be from this shoulder but if it is a straight piece the distance will be from the extreme end. When the correct position has been obtained the frame is fastened with the knurled head screw O.

Slip bushing P, suitable for the hole to be drilled in the piece, is then placed in the lining bushing. The locating bushing D, with its hole of the proper diameter for the piece to be drilled, is then placed in the jig being positioned with the pin E in the slot on the flange of the bushing. The square head screw G is now tightened against the bushing to hold it securely in the jig.

Placing Workpiece in Bushing

Workpiece to be drilled is then placed in the bushing D. If the workpiece has a shoulder, either round, hexagon or other shape, the piece is slid into the bushing until the shoulder of the workpiece comes in contact with the outside of the bushing. However, if the workpiece is a straight detail it would be slid through the bushing until the end is flush with the outside surface of the bushing. By using this locating procedure all the holes drilled on several lots of details would be interchangeable.

When the workpiece has been positioned the knurled head screw Q is screwed down and as this passes through a hole in the bushing the screw contacts the piece and holds it securely for the drilling operation. A hole can now be machined in the workpiece, the drill being guided through the slip bushing P in the conventional manner. If holes are to be drilled in other positions the screw O would be released, the holding frame moved and located with the index pointer in the new position and then the bushing holding frame can be fastened with the knurled head screw O.

It can readily be seen that with the use of this universal drill jig holes can be machined in various positions and to several sizes up to the capacity of the particular tool. Drill jigs of larger or smaller design using the same features as here described could be made for other sizes of details to be drilled. The drill jig is easy and quick to operate and by designing and making one tool instead of several the special tool cost is lower and further the results obtained are much more satisfactory than would be possible if the holes were drilled by the slower, more costly lay-out procedure.

"Hey, Joe!" he says,

"We Gotta' have steel Now!"

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In the *first* place, we've got a complete line of drawn, ground and polished bars . . . annealed and tempered spring steel . . . feeler gauge stock . . . cold drawn rounds, squares, hexagons and flats, ready for immediate delivery.

And in the *second* place, we've got the equipment and men to fix up off-size sheets, strips and coils to meet exact specifications. Our steel resizing service includes shearing, slitting and edging . . . but we work from your specifications right down to the packing and delivery.

Remember . . . large scale production isn't "around the corner" . . . it's *here!* Your fabrication demands *speed* . . . and your customers demand *quality*. The best advice we can give you is this: take advantage of Gensco's Specialized Steel Service!

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HOW PRODUCTION OF ROLLER CHAIN PINS JUMPED 300%

THE UNION CHAIN AND MANUFACTURING CO., Sandusky, Ohio, sprocket chain manufacturers, had difficulty keeping roller chain pin production in pace with the rest of the chain manufacturing operation. A bottle-neck lay in the end softening operation of the case hardened chain pins.

E. B. Pedersen, Airco Technical Sales Representative, suggested oxyacetylene flame softening, and with Union Chain engineers, devised an automatic flame softening unit. An Airco 9903 torch with specially designed extensions was used. A No. 2 tip, placed about 1½" away from the 5/16" diameter pin, softens the cottered end to a depth of 3/16". A No. 1 tip, somewhat closer, softens the other end to a depth of 1/16". A subsequent operation skins the head on the softened end of the case hardened pin.

With the exception of feeding pins into the chute, the unit is completely automatic, depth of softness is accurately controlled, and pin production has increased 300%.

• • • •

Technical Sales Service — though not a packaged commodity — is as readily available to all industry as any Airco process or product. If you have a metal working problem, ask to have a Technical Sales Division man call. Address Department S-8085, Air Reduction, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas. On West Coast: Air Reduction Pacific Company, San Francisco 4, Calif.

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TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

Fretting Corrosion

(*Continued from Page* 76)

practical, if not impossible.

A shear coating, such as lead plate, has been found effective in some instances in reducing friction and alleviating the resultant fretting corrosion. Use of a lubricant incorporating graphite has also been beneficial in some instances, although ineffective in others. One such successful application involved the torsional vibration damper of a medium speed diesel engine, wherein the use of a graphited oil was reported to be effective in reducing fretting corrosion.

With regard to residual stresses, Almen has pointed out that shot peening offers the double advantage of inducing stresses and of increasing friction, which helps prevent slipping.

Lubrication and Lubricants—Solutions by means of lubricants have been investigated in sufficient detail to warrant special discussion. Such solutions are also of special interest to users and operators, as opposed to other remedies which can be applied only by machine designers or builders.

It has been found that severe fretting corrosion can be greatly reduced, although not entirely eliminated, by the use of low-viscosity, fluid lubricants. By excluding air, lubricants retard oxidation. Although high viscosity oils would appear preferable for this purpose, lubricants incorporating low viscosity and high tenacity have also been effective. Mobility of the lubricant, then, is important, as well as high film strength, in protecting the surfaces.

This has led to a recommendation of strong adhesive and extreme pressure (EP) properties for lubricants to be used in combating fretting corrosion. Fluid rather than channeling lubricants are preferred by the same writer, who also lists high resistance to oxidation and deterioration as desirable properties of the lubricant. Submergence of contact areas with lubricant, where at all possible, has been recommended without exception by those investigators dealing with lubricants.

Submergence, coupled with the use of low viscosity, high-film strength lubricants appears to offer the most likely solution to fretting corrosion difficulties from the direction of lubrication. This direction (lubrication) is not always the most effective in a given problem and, besides, there are many problems to which the recommended practices can not be applied. It should be remem-

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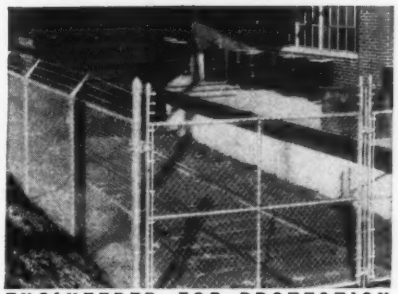

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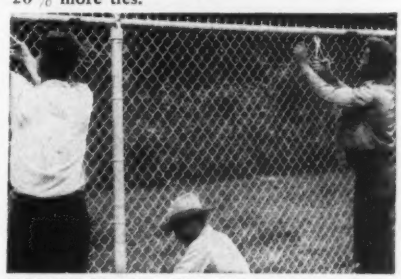

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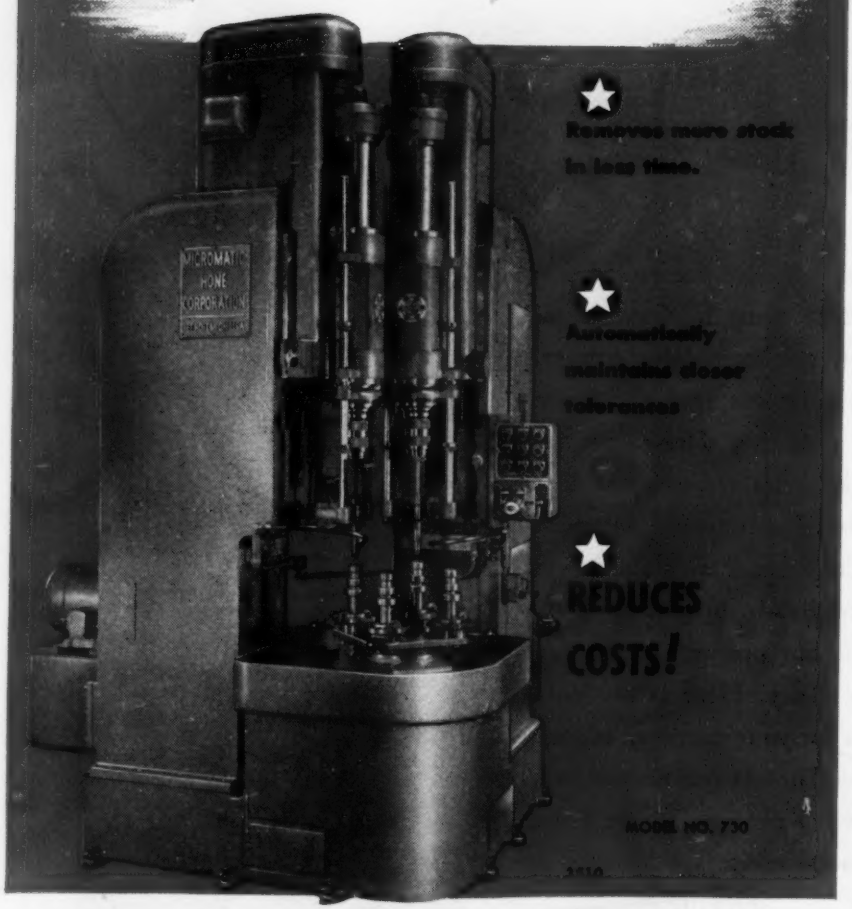

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Micromatic now offers a new multiple spindle, unit constructed, Quill type machine with added power and control for removing more and more stock in less time from harder materials. Completely automatic, electronic control of uniform size within .0001 to .0003 inch in production.

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Micromold Manufacturing Div., Boston Post Road, Guilford, Conn.

bered, too, that lubrication has not been completely effective in eliminating oxidation, even under favorable conditions.

The development of "antifretting corrosion" lubricants does not appear too likely in view of the influences of load and motion upon the phenomenon.

Antifriction Bearings — Since several investigations of fretting corrosion have dealt specifically with ball and roller bearings, the conclusions pertaining to these are of sufficient interest to list separately. Given below are the recommendations of a large bearing manufacturer for solution or alleviation of friction oxidation in oscillating bearing applications:

(1) Elimination of load and motion (vibration) factors affords the most desirable solution. (2) Loads should be reduced at least to 50 per cent and preferably below 35 per cent of those given in bearing catalogs, using as the revolutions per minute one-half the number of reversal per minute. (3) The total movement of the bearing should be sufficient to turn the balls or rollers at least 180°. (4) Fluid lubricants with strong adhesive properties and high resistance to oxidation are preferred. (5) Seals and enclosures should be provided to keep contact areas submerged in lubricant. (6) Bearing looseness and machine vibrations should be kept to a minimum.

Investigations of fretting corrosion and allied effects in antifriction bearings are continuing, although the problem is not critical with the industry in general, but rather with certain applications which by virtue of the operating characteristics are particularly suscepitible.

Among these are grease lubricated, oscillating aircraft control bearings, as has been mentioned before. This application is under close observation by the military air services, bearing manufacturers, aircraft manufacturers and lubricant suppliers.

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—o—

Oilers, oilseals, grease cups, sight gages, fittings, accessories and tools are pictured on a chart made available to engineers, designers and buyers of lubricating equipment by Gits Brothers Mfg. Co., Chicago.

Heat Treating

(*Continued from Page 78*)

hearth level in side walls handle venting. Combustion gases are discharged over and under the charge, then pass around the charge and downward into the flue ports.

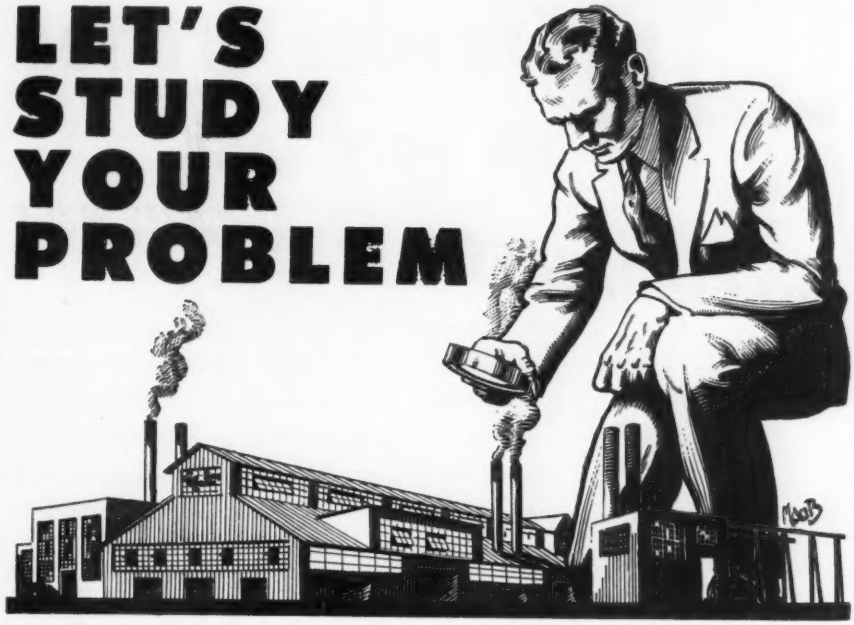
Temperature is controlled by five sets of Leeds & Northrup automatic temperature control equipment. Gas flow is controlled by air flow through burner aspirators by means of atmospheric regulators, and air flow is controlled by means of port valves adjusted directly by the temperature control instrument.

Safety control equipment protects the furnace against failure of gas or air supply. This consists of a solenoid valve in the gas line ahead of all other equipment, functioning under control of pressure switches in gas and air supply lines. The safety control also prevents lighting burners until all burner valves are closed and until the furnace door has been open for 5 minutes.

Quenching—The quenching tank is of all-welded construction, using 7/16-inch steel plate. Quenching oil is kept at a constant temperature of 110° F by recirculation through an automatically controlled tube type heat exchanger with water for cooling medium. The agitated quench, developed by United States Steel Corp., gives close control and uniform properties in heat treated bars because the spacing of propellers and bar charge makes cooling uniform. Agitation is produced by 24-inch diameter, four-blade, motor-driven propellers mounted along each side of the tank in staggered relation to those on opposite sides. Propellers on one side direct oil over the charge and those on the other side direct oil under the charge.

Agitation was carefully engineered with respect to propeller size and driving power, and to positioning of products and propellers, in order to obtain a uniform oil flow turning over approximately eight times the volume of the tank per minute. At this rate of agitation the scale collected in the bath from previous charges impinges on the surface of the bars and removes the loose scale as well as any layer of bubbles that form on the bar during quench, thus cooling the bars more uniformly. This type of agitation removes heat uniformly from the entire surface of each bar. Uniformity from size to size of bars and from heat to heat is accomplished by properly timing each quench to suit conditions.

Handling Fork—The 6-ton bar handling fork, supported by an overhead crane, was designed and built



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Is it Increased Capacity?

Is it Materials Handling?

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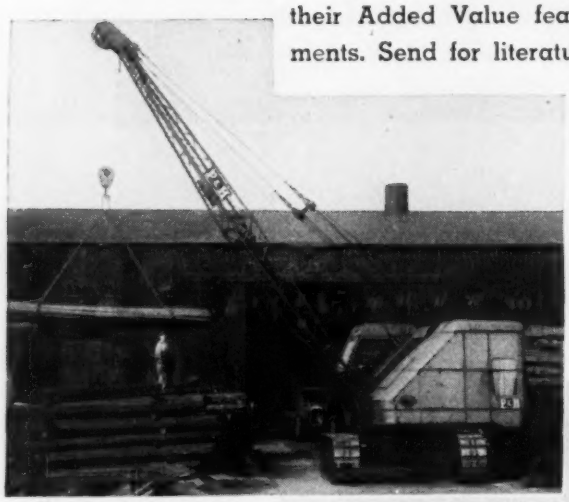
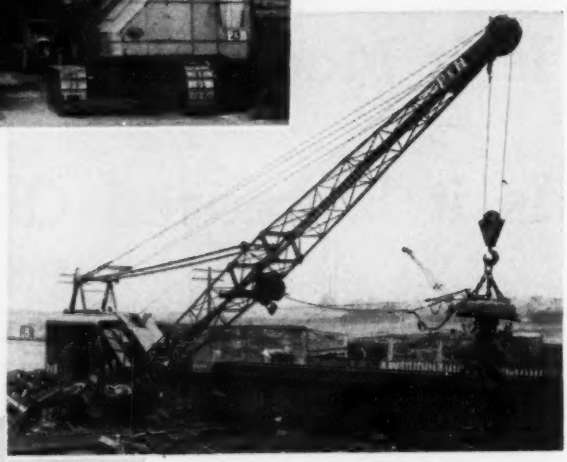


CRAWLER

P&H Crawler Cranes are easy to operate because of P&H's smooth, responsive hydraulic control. You can operate them in close quarters because of P&H's exclusive and simplified method of steering and braking.



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Equipped with magnet, the P&H Crawler Crane loads scrap quickly. For those countless lifting jobs in plant yards, you can make no better choice than a P&H. Its construction of rolled alloy steels means extra long, trouble-free service.

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by Spang-Chalfant, using tubing largely. Each of the 11 fingers is made of 3-inch outside diameter tubing formed to the required shape, welded to a webbing and to a 13⅜-inch outside diameter horizontal supporting member. Piercing this member are eight 9-foot lengths of 5-inch outside diameter pipe which serve as supporting arms and rest on a support framework within the tank. Welded between some of these arms near their ends are lengths of the same size pipe that engage with guiding members above and in the tank.

Fire Protection—The quench tank and associated equipment is protected against fires by a water fog system consisting of two separate groups of open fog nozzles; 22 for tank protection and 26 for the motor and pump pits surrounding the tank. Each group will operate automatically and manually. Water is supplied to the system at 100 pounds pressure. The Suprotex-Deluge system of Automatic Sprinkler Corp. of America, Youngstown is used.

Oil pumps start automatically if a fire breaks out and deliver oil to storage tanks at 1000 gallons per minute. As a last resort, the tank can be drained directly into a sewer for disposal. An emergency exit to the outside of the building has been provided for the craneman.

This equipment has been in operation long enough to produce more than 2000 fully heat treated drill collars. In comparison with the company's discarded heat treating process, there has been a marked improvement in the straightness of these exceptionally long bars after heat treatment; a substantial reduction in straightening costs; fewer reruns; and a higher quality product, free from internal strains that might be released in service.

Faulty Loading Causes Container Damage

Faulty loading practices were found to be prime factors making for the current high rate of damage to packaged freight according to a recent study by Shipping Container Institute, New York. As part of an intensive study of the causes and responsibility for shipping damage 700 freight cars were inspected at point of loading and at their destination.

Unremoved nails and straps from previous shipments often result in serious damage to containers. A light should be brought into the freight car so all potential sources of damage can be removed. Substantial reductions in damaged shipments result from few minutes required for this work.

A HUMOROUS APPROACH TO A SERIOUS MATTER

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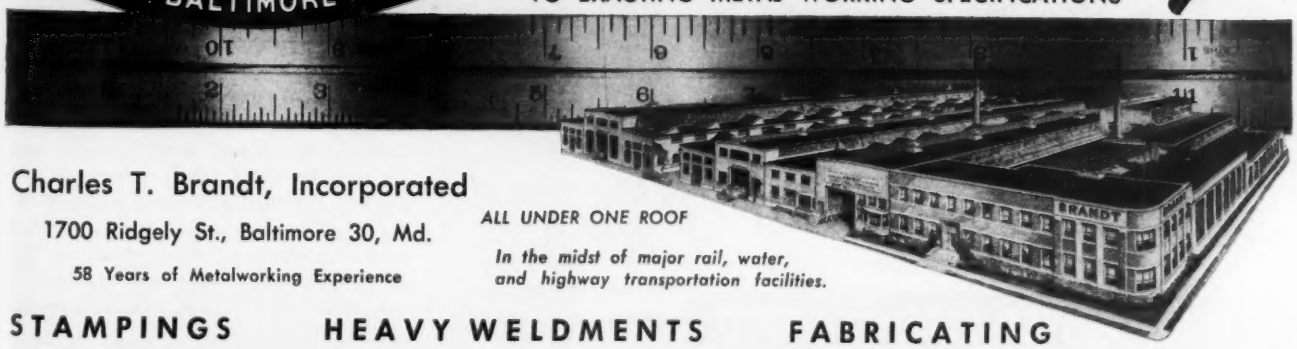

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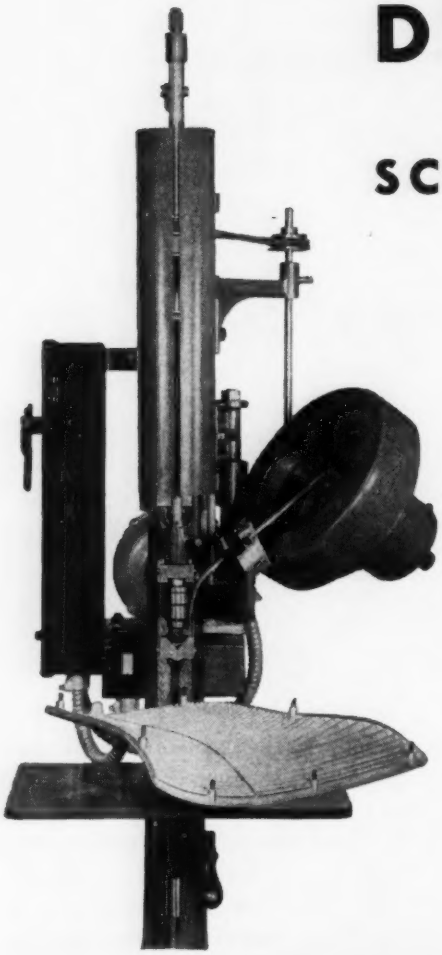
DETROIT *—Power—* SCREWDRIVERS



Hopper-feeding eliminates the handling of studs . . . . Machine is equipped with Titan or Modern stud-setters . . . Machine will drive up to ¼ inch diameter studs in lengths up to 1¼ inches in untapped holes in die castings or tapped holes in steel.

Illustration shows studs being driven in automobile grille, all to uniform height in untapped holes.

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Chemical Prevents Cooling System Scale

Uninterrupted service of annealing furnaces without shutdowns for descaling of cooling systems at Spun Steel Corp., Canton, O., has become possible with use of Micromet, a slowly soluble phosphate glass, developed by Calgon Inc., Pittsburgh. Formerly it was necessary to shut down each of four annealing furnaces for a 48-hour period every 9 to 12 weeks to clean out scale deposited by hard water.

Each annealing furnace normally uses 250,000 gallons of water per month, but scale formation in coils and ducts increased water consumption because scale insulated pipe and reduced its ability to remove heat. First installation of a tank type feeder for the chemical was made on a furnace after it had been manually descaled. After 10 months of operation a descaling shutdown still was not required. Since original installation, similar systems were installed on remaining three furnaces without descaling. After three months of operation examination of their cooling systems revealed that scale formation has been completely arrested and old deposits are softening.

Chemical in feeder dissolves at a constant rate of approximately 25 per cent per month. Consequently, supply needs to be replenished once a month with 25 per cent of initial feeder charge.

Photoelastic Resin Aids Stress Study

Photoelastic resins of Fosterite family in sizes and shapes suitable for any kind of three dimensional study of "frozen stresses" are believed possible with a new process developed by H. F. Minter and M. M. Leven of Westinghouse Research Laboratories, Pittsburgh. One piece cast recently measured 6 inches in diameter and 3 feet long compared to the former limit of pieces 1⅛ inches thick. New resin also is 35 per cent more sensitive optically for frozen stress measurements than standard material and does not fade from usefulness with time.

In actual use photoelastic resins are made up into models which are heated, loaded and gradually allowed to cool to room temperature. When viewed through polarized light, plastic replica shows location, direction and magnitude of stresses. Since the process is still in experimental stage, the new resin is not available commercially.

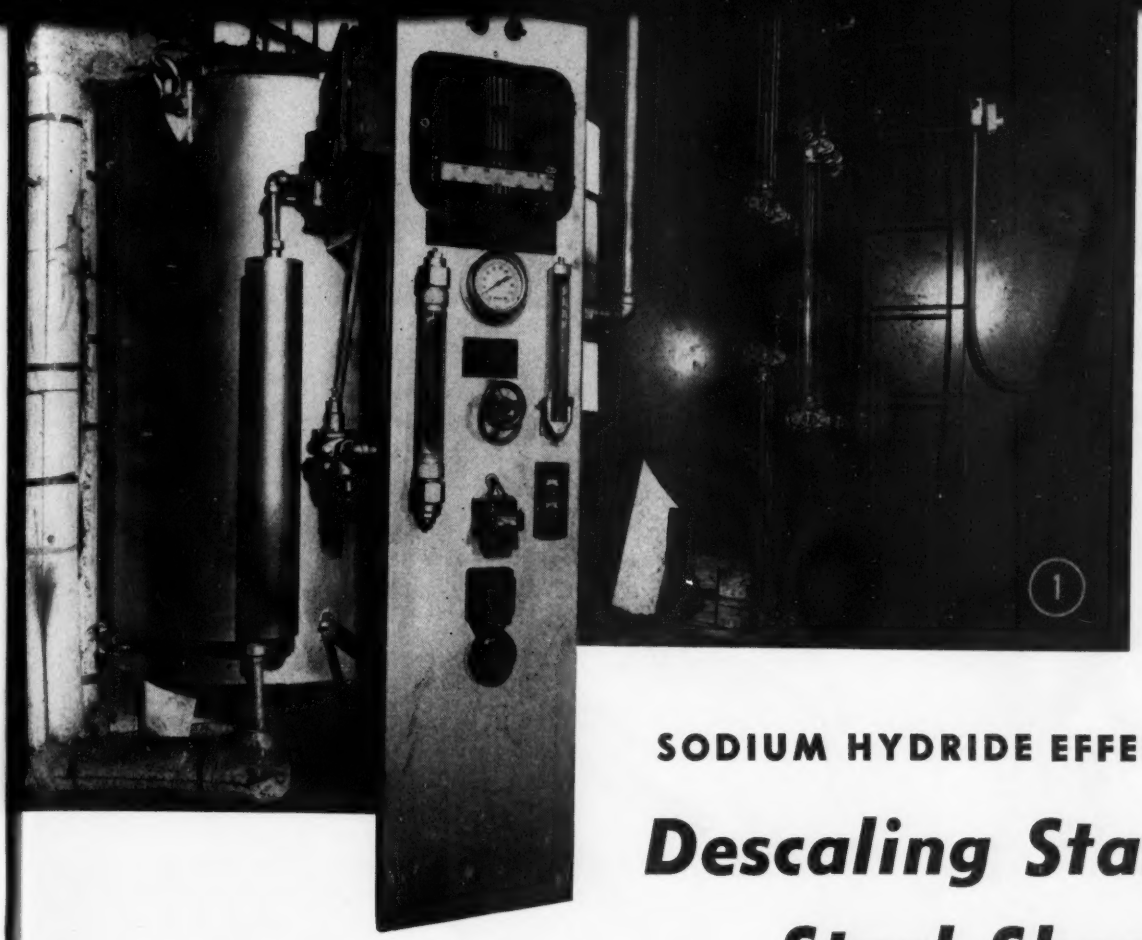

Fig. 1 — Ammonium dissociation unit which supplies hydrogen for descaling process

SODIUM HYDRIDE EFFECTIVE IN

Descaling Stainless Steel Sheets

Oxides on surface of sheets are reduced to lower forms by action of bath, without any attack on metal. Total immersion time averages about 15 minutes. Process is faster and simpler than acid pickling for some grades of stainless and affords better quality

By M. H. LEBOWITZ
Superintendent of Finishing, Wood Works
Carnegie-Illinois Steel Corp.
McKeesport, Pa.

SURFACE quality is improved and finishing operations speeded during final processing by the use of a molten sodium hydroxide bath, impregnated with sodium hydride, for the removal of scale from stainless steel sheets rolled at the Wood Works, Carnegie-Illinois Steel Corp., McKeesport, Pa. Hot-rolled and annealed sheets, cold-rolled and annealed sheets, and sometimes semi-finished sections from which sheets are rolled are treated by this method. In operation since 1944 in this particular plant, the process has proved to be the solution for many difficult pickling problems, especially since sheets of more than one grade or chemical composition may be cleaned simultaneously in the bath without any ill effects. The Wood Works was the first steel plant to employ the method for descaling of stainless steel sheets in large quantities.

It is difficult to pickle many grades of stainless steel, notably the 25 per cent chromium; 20 per cent nickel, 25 per cent chromium; 12 per cent nickel; 12 per cent heat-treated chromium grades; and, 5 per cent chromium steels, by immersion in acid solutions to remove the oxides formed on the surface during heating for rolling or annealing. These difficult grades are readily cleaned in the sodium hydride process, as well as numerous grades that are amenable to acid pickling, such as 18 per cent chromium; 8 per cent nickel, 18 per cent chromium; 8 per cent nickel grade containing molybdenum, 18 per cent chromium; 8 per cent nickel steel containing titanium, and 18 per cent chromium; 8 per cent nickel containing columbium; and, 17 per cent chromium.

Anhydrous sodium hydroxide is used as the initial bath material. The bath (Fig. 3) contains approximately 40 tons of caustic (sodium hydroxide) in a carbon-steel open top tank that is 7 feet wide, 15 feet long, and 7 feet deep. The caustic is melted and maintained in the molten condition at the proper temperature for descaling operations by 14 immersed, gas-fired U-tube heaters. Products of combustion from the heating tubes are vented to a common manifold that carries them outside the building through suitable duct-work by fan-induced draft.

Removal of scale from stainless steel sheets is effected by direct chemical reduction of the oxides forming the scale through reaction with the sodium hydride generated in six generators partially immersed in the molten caustic, with open bottoms through which the sodium hydride diffuses into the molten bath. These generators, which extend several inches above the surface of the molten caustic, are constructed of stainless steel sheet of relatively heavy gage. They are of welded construction, and are equipped with removable covers that permit bricks

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EVERYTHING FOR WELDING

Fig. 2—Hot load of stainless steel sheets entering quenching station

Fig. 3—Molten caustic bath maintained at desired temperature by 14 immersed gas-fired U-tube heaters

of metallic sodium, weighing 5 pounds each, to be dropped periodically into the molten caustic in the lower part of the generator. Stainless steel is used for building the generators because it is more resistant to the corrosion that occurs at the liquid-air interface of the bath, and lasts six to eight times as long as carbon steel would in this severe service.

Hydrogen gas, produced by dissociation of ammonia in equipment located in a separate building, is fed into each generator at a point about 10 inches below the surface of the molten caustic in the generator. The metallic sodium and the hydrogen react to form sodium hydride that diffuses into the bath through the open bottom of the generator, as previously described. Excess hydrogen escapes from openings in the cover, where it is ignited by a pilot flame and burned in air. Presence of the hydrogen flame indicates that a consant flow of hydrogen is being maintained in each generator. Flow rate of the hydrogen is measured by a flowmeter. Concentration of sodium hydride in the bath is maintained at between 1.5 and 2 per cent. Concentration may be checked rapidly by casting a standard sample of the bath material in the form of a pellet in a special mold, and then titrating the pellet in a simple apparatus to determine the amount of gas evolved by the pellet.

Sodium hydride in the molten bath reacts with the oxides on the surfaces of the sheets, reducing them to lower forms of oxide or to metal, without any attack on the metal of the sheets.

Sheets are handled during processing in crates built of 18 per cent chromium—8 per cent nickel steel containing molybdenum. About 4½ tons of stainless steel sheets can be effectively descaled per operating hour. Individual loads of sheets range up to 3 tons. With the bath operating at a controlled temperature between 680 and 720° F (710 degrees optimum), the total immersion time of 15 minutes is required for a typical load of sheets. About 7 to 8 minutes of this time is consumed in heating the load to bath temperature and restoring the temperature of the bath. The remainder of the time is expended in actual descaling. Caustic dragout approximates 1½ tons per 24 hour operating period.

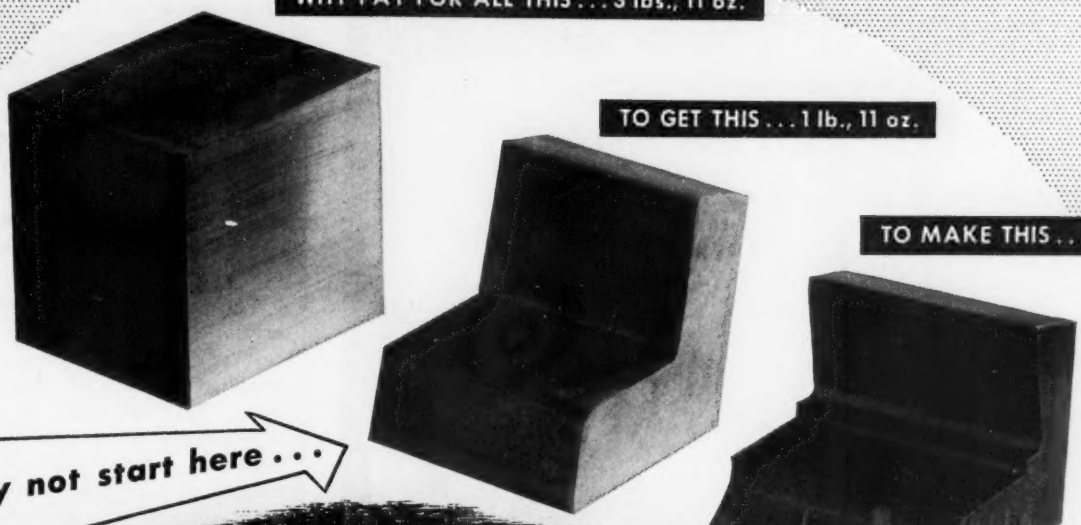
While some grades of stainless steel can be satisfactorily cleaned by acid pickling, the sodium hydride process is faster and simpler, resulting in better quality. It, therefore, is used exclusively for production descaling in this plant.

After removal from the bath, the stainless steel sheets are immersed, while still hot, in a rectangular tank of cold water, which operation tends to blast off any adhering reduced material on the sheet surfaces. The tank (Fig. 2) is set 8 feet below floor level, and is guarded by an 8-foot high shell above floor level, equipped with water sprays placed about 2 feet from the top of the guard.

Next, the crate load of sheets is immersed in a 5 to 10 per cent sulphuric acid solution that definitely neutralizes any adhering caustic. Following this, the sheets are dipped in an 8 to 10 per cent nitric acid, 1½ per cent hydrofluoric acid bath to give a desirable bright finish. A final cold water rinse is performed in an overflow type of tank, after which the sheets are put through high-pressure sprays individually to remove any remaining smudge. Then they are passed, one at a time, through a hot-air dryer equipped with squeegee rollers at its exit end.

No objectionable fumes arise from the descaling bath, so that no ventilating problem exists in this location. However, when a load of sheets is quenched in the water tank after withdrawal from the molten caustic

HOW MUCH *high priced tool steel* do you WASTE?



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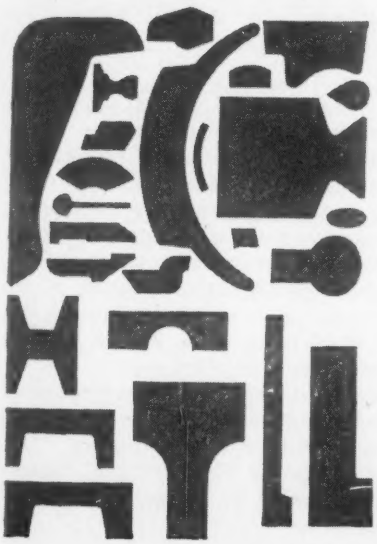

Disston hot rolled special shapes are supplied in both alloy and carbon tool steels, and in electric and open hearth grades. All shapes are rolled to close tolerances and the finish is exceptionally fine.

Send us dimensional sketches of the shapes you require, together with the analysis and approximate quantities desired. Full particulars will be sent to you promptly.

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bath, large quantities of steam are generated. A ventilating system using stainless steel for the duct-work operates satisfactorily. The stainless steel ducts successfully resist attack by caustic, which would cause wooden ducts to deteriorate rapidly. A double door system permits the entire capacity of the fan to be utilized to remove steam from quenching, after which the doors are adjusted to permit the system to resume its task of continuously venting acid fumes from the acid solution tanks. Capacity of the stainless steel fan that operates the ventilating system is about 28,000 cubic feet per minute, handling both acid fumes and steam from quenching. Fumes are discharged through a stainless steel stack.

To maintain proper rate of generation of sodium hydride, 150 cubic feet per hour of hydrogen must be supplied to each of the six generators. This hydrogen is obtained by dissociation of ammonia. The dissociation equipment (Fig. 1) is housed in a separate building, and is fully automatic in operation. Its capacity enables it to produce a maximum of 1000 cubic feet of hydrogen per hour.

The ammonia storage tank in the dissociator building is of 13,000 gallon overall capacity, having an operating capacity of 10,000 gallons. Electrically heated, the dissociator employs a nickel catalyst to promote dissociation of the ammonia at a temperature automatically controlled at 1750 degrees Fahr. Output of the dissociator is automatically regulated by the demand for hydrogen as determined by the flow-rate settings at the generators in the molten caustic bath.

Maximum hydrogen output of this equipment is 1000 cubic feet per hour, which is more than ample to satisfy the 900 cubic feet per hour total requirement for the six sodium hydride generators.

—o—

Announcement of a $1,500,000 research fellowship program in physical sciences was made recently by United States Atomic Energy Commission. Fellows will undertake studies in fields which include nuclear processes, theory and production of atomic energy and utilization of fissionable and radioactive materials. In most cases work will be done at a university or other independent research establishment. Also announced by the commission is the publication of, "Lecture Series in Nuclear Physics," prepared by a group of experts who assisted in development of the atomic bomb.

Life of Linings

(*Continued from Page* 88)

longer life and cleaner finished product are always present in this refractory.

Along with its nonwetting feature it is extremely resistant to the cutting action or erosion due to slag, possessing much greater ability to withstand this than clay brick. This graphite base brick has been used in connection with both acid and basic metal slags.

Another feature is the temperature resistance. It is a well-known fact that graphite is one of the most refractory materials which is obtainable in commercial abundance. Previously, however, it was necessary when using carbon or graphite as a refractory, to guard against oxidation. This meant that either the refractory containing carbon or graphite must be used in a reducing or nonoxidizing atmosphere, or if used in an oxidizing atmosphere, then it must be protected with a refractory coating to stop the oxidation which would occur as soon as a dull red heat was reached. With this new refractory, it is safe to use intermittently in alternating reducing and oxidizing conditions without any protective coating.

Testing Carbon Pick-Up

A question often asked by nearly all persons when a graphite base brick is mentioned concerns carbon pick-up in the finished product. These bricks have been tested in many different applications and in no case has there been reported carbon pick-up either in steel or allied industries, even when used in steels of stainless quality. There are several reasons for this. Primarily the graphite base characteristics of the brick discourage carbon pick-up due to the company's special technique in proportioning and forming of the refractory ingredients, also the firing methods used in finishing the green ware. Secondly, the wear of the refractory is so slight per unit of metal melted or poured over it that any pick-up of carbon to date has not been noticeable.

The use of this refractory results in a cleaner poured product as the erosion of refractory materials is reduced to a minimum. This in turn results in less inclusion forming material being present in the fluid metal or glass.

A natural result of the above features of nonwetting, less erosion and corrosion higher temperature resistance, greater resistance to heat shock is a longer life in the installation. Direct savings are the results along with a savings of labor costs, as

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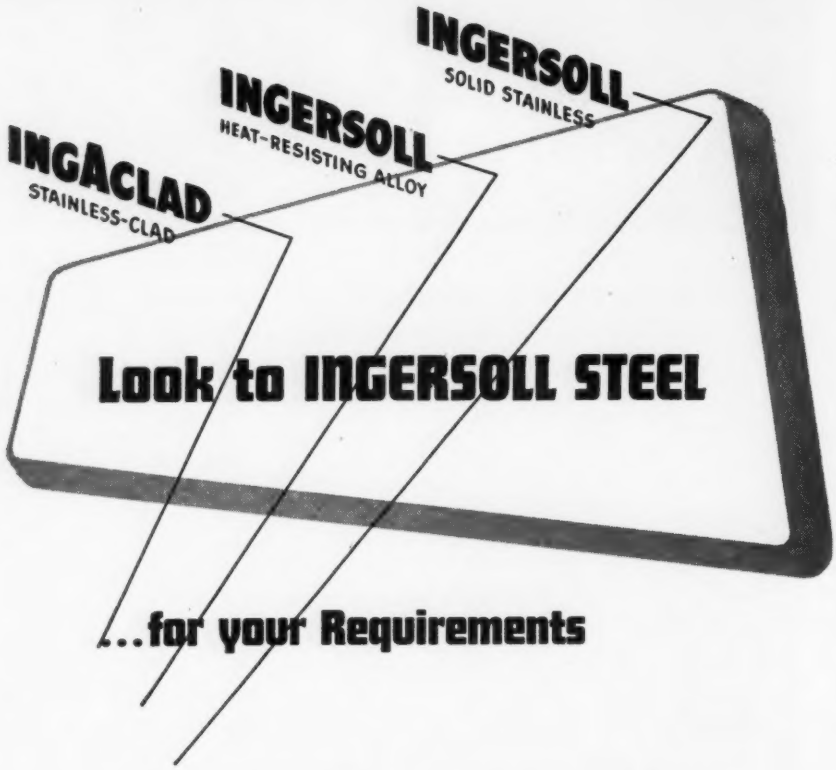

You've got a problem involving steel. You're planning a new product . . . modernizing your plant . . . designing new equipment. You may need solid stainless . . . maybe stainless only on the exposed or contact side . . . maybe a special heat-resisting alloy.

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well as less down time of manufacturing equipment and processes along with increased production.

Applications to date have been in metal melting installations, every place where molten metal is in contact with the refractory; namely, blast furnace skimmers and runners, blast furnace ladles, mixer spouts, hot metal ladles from mixer to open hearth, iron pour-in spouts and steel ladles. Electric furnace steel interests are using this refractory in pour-out spouts and ladles. Foundry applications include: Cupolas, spouts and ladles, as well as specialty installations, such as pour out box and in mold work.

Application Tests Conducted

Tests now under way include applications in both carbon and electric furnace steel facilities, foundry installations, roll furnace installations, aluminum, brass and glass, and blue gas and synthesis gas manufacture.

The graphite base refractories are available in both the 8½ x 4½ x 2½ and 9 x 4½ x 2½-in. series. Cupola blocks, mold plugs, blocks, special sizes and shapes also are available.

In addition to brick sizes and shapes, the company has developed a Grafset mortar similar in action to the brick and is used in conjunction with it. Also a plastic ramming mix called Grafram is rapidly gaining in popularity for monolithic installations for ladles and spouts. Exceptionally long life has been obtained by lining small hand ladles with the ramming mix.

This graphite base brick is considered an innovation in the refractory field. Its importance in aiding melters to obtain cleaner steels is well recognized. Longer refractory life naturally enables a saving of labor and permits greater tonnage output per unit of equipment because of the reduction in less nonproductive days per year due to shutdown time for relinings.

—o—

Results of experiments in use of radio in mine disasters show that low frequency radio offers a distinct possibility of success according to a publication recently released by Bureau of Mines. Low frequency systems may also be employed in everyday mining operations by utilizing aid of metallic circuits offered by trolley wires, rails and pipes. Commercial type radio frequencies including apparatus used by the armed forces during the war do not appear suitable for use in underground communications.

New Gear Stimulates Auto's "Floating Ride"

Combination of a flexible tubular steel leg with a coil spring oleo unit similar to the "floating ride" principle of the automotive industry provides three separate points of shock absorption and results in softer light-plane landings. Landing gears on all two-place planes manufactured by Luscombe Airplane Corp., Dallas, are being supplied with this gear as standard equipment.

Essential differences between new and old gear are: Replacement of the old tubular steel and tierod truss structure with a full cantilever heat treated chrome molybdenum alloy steel leg, and introduction of a completely redesigned hydraulic unit. Although there are 17.15 per cent fewer parts in new landing gear, weight is approximately the same.

Reports Cover Native Manganese Production

Maganese—an important component of steel—from native sources in Arizona, Utah and Oregon, was the subject of wartime investigations conducted by the Bureau of Mines to determine the most effective ways of commercially producing the product. The results of these investigations are contained in five separate publications published by the bureau and the Department of the Interior.

The five publications and the geographical locations in which the investigations took place are as follows: Report 4140, Long Valley, Coconino County, Arizona; 4148, Mohave County, Arizona; 4141, Southeastern Jaub County, Utah; Ophir, Toole County, Utah; Sheep Mountain Property, Durkee District, Oregon.

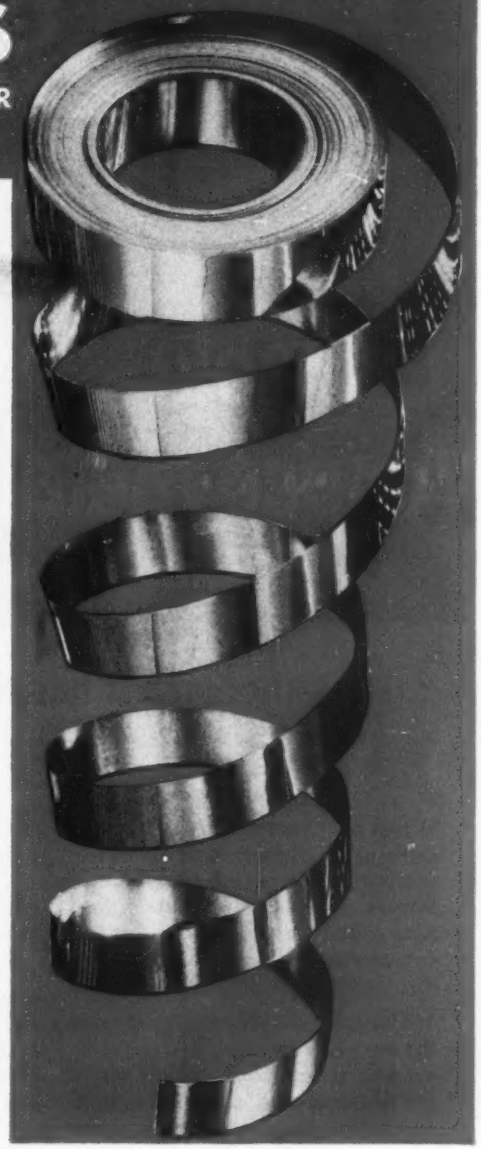
New Concept in Gear Inspection Advanced

Presentation of a new concept in gear inspection based on use of a gaging element as a single threaded worm was made at American Society of Tool Engineers Show in Cleveland, by Eastman Kodak Co., Rochester, N. Y. Master worm section can be manufactured with greater accuracy than conventional master gears, stated Louis D. Martin, company representative, in a paper presented at the show. It can also be used to check either spur or right and left hand helical gears regardless of helix angle.

Several instruments of variable center-distance type have been developed to provide means of checking composite error in gears ranging in size from

SHORT on STEEL?

NICKELOID METALS MAY BE THE ANSWER



Why fight the steel shortage when it comes to bright metal for decorative or functional use? Nickeloid Metals offer ready availability of bright chrome or nickel plated finishes on base metals of brass, zinc, or copper — quality metals, yet no insurmountable cost premium. If you now use steel and plate or finish the parts in your own plant, there are important savings in the use of Nickeloid Metals. They simplify the whole manufacturing cycle: just stamp or form . . . then assemble. Available in protective Mar-Not coating; in flat sheets or coils; bright or satin finish or patterns; many gauges and tempers. Ask our representative to call.

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When a famous motorcycle manufacturer specifies Ampco Metal for valve-seat inserts *he knows his customers are getting a "plus" value.* And that value is featured by the manufacturer in advertising literature as an important sales appeal!

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smallest watch pinions to pitch diameters of as much as 8.25 inches. Gear is meshed with rack like worm section traversing along its axis and variations in center line distance are measured either directly on a gage or by an automatic charting device. Separate errors which make up composite error can be evaluated from chart.

Advantages of these new instruments are inherent in master worm section, Martin continued. Since it is ground as section of worm, on a thread grinder, it can be held to extremely close tolerances. As a result, it absorbs little of total tolerance allowed in inspection.

Some other advantages advanced for use of master worm gear as inspection tool are: Lower ultimate cost because master worm may be reground, it can be made in finer pitches than circular masters, no special center distance corrections are necessary when nonstandard gears are checked since operating and standard pressure angle are always the same and checking for crown or taper is possible by moving gear at right angles to master worm section.

Regular Inspection Reduces Repair Time

Electrical equipment maintenance check list developed by Westinghouse Electric Co., Pittsburgh, is intended to assist plants in keeping their equipment running without breakdowns by using preventive maintenance. Recommended procedures for motors are: Keep motor components clean, lubricate regularly, examine bearings, check air gaps, inspect brushes and commutators and inspect exposed leads and ground connections. Frequency of all inspections and maintenance hints for control equipment, wiring, fuses, transformers and lightning arresters are included on the chart.

Abrasive Belt Machine Uses Shown in Movie

Abrasive belt machining of metals, plastics and composition materials is shown in a 16 mm sound film released by Porter-Cable Machine Co., Syracuse, N. Y. Many sequences were filmed during working hours and under actual shop conditions in various plants throughout the country. Development of process is traced from earliest dry belt models to present machines utilizing special cloth-backed abrasive belts for use with coolants or soluble oils.

Among operations featured are:

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

Fitchburg Grinding Machine Corp. has a machine that grinds automobile valves to size at the rate of 2,160 per hour.

get ready with CONE for tomorrow

Small glass globules of exploded glass, similar to popcorn are made by Dant & Russell of Portland, Oregon, and are used to replace sand in plaster.

be ready with CONE for today

Reaction of corn sugar with hydrogen to form sorbitol is accomplished in minutes by the new high-pressure catalytic process of Atlas Powder Co.

get ready with CONE for tomorrow

The new plant of Houston Oxygen Co. will be the first to produce acetylene commercially by the electric "glow" process.

be ready with CONE for today

A library of rubber technology, sponsored by the American Chemical Society, will be set up at the University of Akron.

get ready with CONE for tomorrow

E. I. duPont de Nemours & Co. claims that its new color film "S-T Tripac," can be processed as simply and quickly as black and white.

be ready with CONE for today

The wheels on the new Corlett-Turner bench grinder can be changed in nine seconds.

get ready with CONE for tomorrow

U. S. Rubber Co.'s new automobile cushions can be inflated to any pressure that the passenger likes.

be ready with CONE for today

The new Tournamover straddles an entire building, up to 25 feet, picks it up and moves it to a new location.

Temperatures down to −456° F. are possible with the new helium cryostat developed by Arthur D. Little, Inc.

get ready with CONE for tomorrow

Roughness measurements around internal and external surfaces of rotation can now be made by means of a Rotary Piloting Fixture offered by Physicists Research Co. for use with the Profilometer.

be ready with CONE for today

Anthracite Industries, Inc., announces that its new coal-burning heater is 38% more efficient than ordinary furnaces and will be made in steam, hot water and hot air models for either domestic or commercial use.

Studies at the National Bureau of Standards show that diamonds are highly sensitive to gamma rays and may be used like a Geiger counter.

get ready with CONE for tomorrow

Chance Vought has a contract to build a new fighter plane that will be made almost entirely of their Metalite sandwich material — a balsa and aluminum lamination. Tests show the new material to be lighter and stronger than conventional materials.

be ready with CONE for today

At the Fort Gibson, Oklahoma, dam, ice cubes are being mixed with concrete to cool it before pouring.

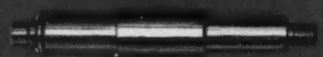
get ready with CONE for tomorrow

The incredible speed of 11 million pictures per second has been achieved by a motion picture camera developed at the University of Rochester.

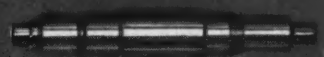
FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

Emphatically Conomatic!

25⅝" long, 16 operations in 63 seconds from 1⅜" dia. hot rolled.

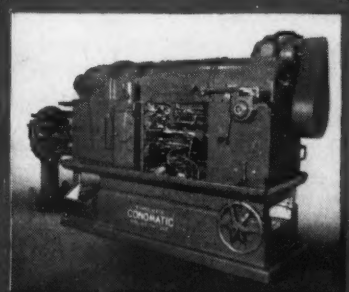


10⅞" long, 16 operations in 65 seconds from 1 41/64" dia. SAE 4620.



10⅝" long, 12 operations in 54 seconds from 1⅝" dia. SAE 3115.

Any good multiple spindle automatic should handle the ordinary run of shaft work. But Conomatics are also adaptable to the unusually *tough* jobs. The illustrations show this plainly.



Ask your CONE *representative to show you our new color motion picture*

CONE

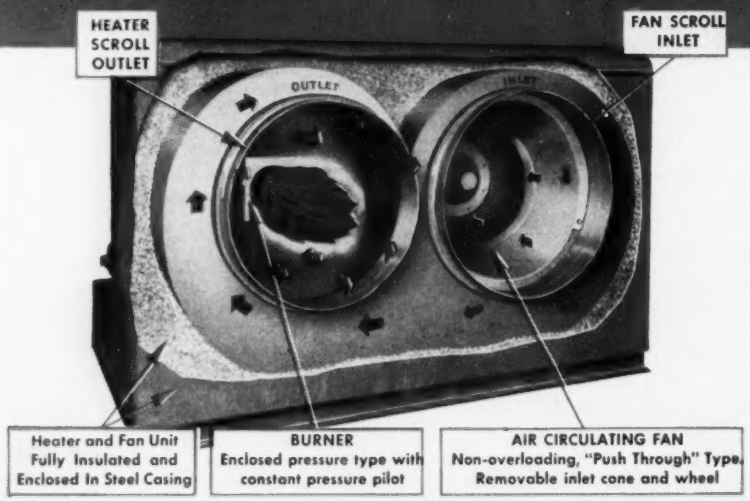
AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

49

NEWCOMB-DETROIT

Scroll-Aire

Direct-Fired OVEN HEATER


HEATER SCROLL OUTLET
FAN SCROLL INLET
OUTLET
INLET
Heater and Fan Unit Fully Insulated and Enclosed In Steel Casing
BURNER
Enclosed pressure type with constant pressure pilot
AIR CIRCULATING FAN
Non-overloading, "Push Through" Type. Removable inlet cone and wheel

WITH DUAL BURNER ARRANGEMENT TO BURN

Gas AND/OR *Oil Fuel*

The Scroll-Aire Oven Heater will burn gas and oil fuel or either one individually as conditions require. The Scroll-Aire is a direct-fired heater which provides greater combustion efficiency. Combining the re-circulating fan, burner, insulated heater casing, combustion air blower, motors, drive and safety controls all on one platform, compact design makes the Scroll-Aire ideal for new oven installations or to "rejuvenate" old ovens. Send for descriptive bulletin which gives complete details on operation and use of this improved heater.

ENGINEERED FINISHING SYSTEMS

During the past thirty-five years, Newcomb-Detroit has designed, built and installed finishing systems for a wide variety of uses in all types of industries. Recently they completed the largest small parts finishing system in the world for an automotive manufacturer. Use this valuable experience to solve your finishing problem, whether large or small.

Established 1912

NEWCOMB-DETROIT COMPANY

Grand Rapids Division
GRAND RAPIDS, MICH.

Main Office and Plant
5741 Russell Street
DETROIT 11, MICHIGAN

Western Sales Office
CHICAGO, Ill.

Removing risers, flashings and parting lines from castings; surfacing large, flat areas to close tolerances, chamfering, edging, squaring, rounding and cutting radii on single piece operations.

Pilot Plants for Ore Reduction Are Developed

Millions of dollars have been invested during past year in pilot plants for improving present methods and developing new techniques in beneficiation of low grade iron ores, and huge ore reduction plants will soon be a vital necessity in the nation's ore fields according to annual review published by Allis-Chalmers Corp., Milwaukee. Recent metallic mining developments include a log washer for removing clay and silica from iron ores, a completely automatic mine hoist control and a solids handling pump capable of handling solids in suspension yet retaining a minimum dilution of material being pumped.

Standardized log washer incorporates a water lubricated revolving cutless rubber bearing on lower end stub shaft, wear resistant steel plate blades and a drive integral with washer. Recommended maximum size feed to a log washer is material which will pass a 3 inch square flat testing sieve.

Flash Welding Gives High Rim Output

Use of a motor operated flash welder has enabled LaPorte Corp., LaPorte, Ind., to produce 480 steel tricycle rims per machine hour. High production of 16 gage hot rolled strip rims is possible with relatively unskilled operators.

Machine used for the operation is a standard flash welder produced by Progressive Welder Co., Detroit, and is rated at 50 kilovolt amperes. Consistent weld quality is achieved with an entirely automatic operation which is controlled by operator from one position. Flash from weld is trimmed in a later operation by restriking in a press.

—o—

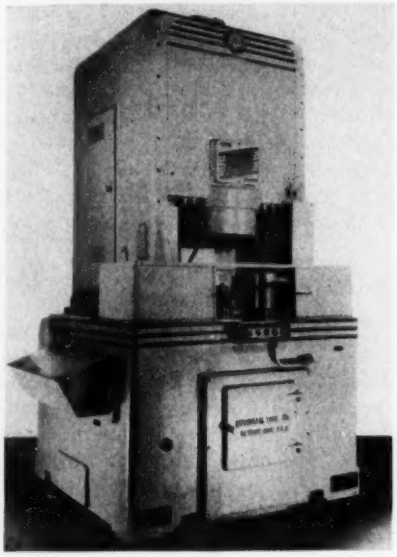
Paint employing a stainless steel flake pigment which can be sprayed on almost any surface has been developed by Stuart-Dean Co., New York. It produces an extremely hard surface which is highly resistant to physical wear and weathering. To date completed projects have included elevator cabs, night deposit boxes, hand rails and entrance doors.

New Products and Equipment

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 134

1. External Shaper

Gears, toothed clutches and other external shapes up to 10 inches outside diameter and 2¾ inches thick may be cut on the model 18103 Shear-Speed external shaper, built by Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. Powered by a 30 horsepower motor, it



will handle work from 7 to 10 inches outside diameter, or as small as 5 inches with special liners. Maximum stroke is 3 inches.

Cutting all teeth simultaneously, the machine performs best on gears or involute splines from 5 to 12 pitch. It will also cut straight-sided splines, sliding clutches, ratchets, inverted splines, etc. Hydraulically actuated wedge pins lock head in cutting position with only a simple initial adjustment of head stop.

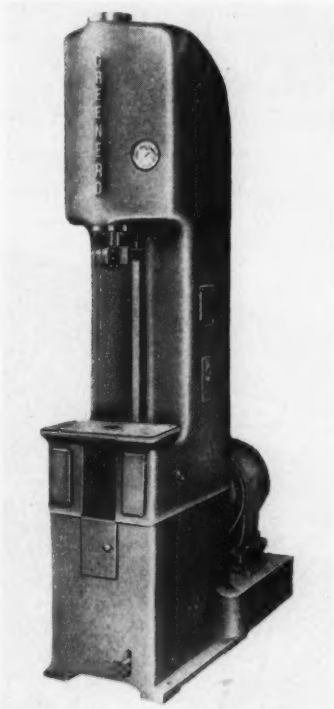
2. Sample Changer

Radioactivity measurements on as many as 25 samples may be made automatically by the new sample changer, manufactured by Tracerlab Inc., 55 Oliver St., Boston 10, Mass. Results are printed on a paper tape. It can also be used for making half life measurements on short half life materials or, with minor changes, for obtaining energy spectrum data on a particular sample by automatically placing over the sample absorbers or filters of varying density and thickness.

Sample changer is one of four components required: Autoscaler for detecting and totalizing radioactive disintegration of sample; Tracergraph printing interval timer; lead shielded manual sample changer to lower background count; automatic sample changer. Samples are loaded in slots on changer's circular disk. Arm with 1-inch inside diameter is dropped over sample, pushing it into the shielded manual sample changer. When properly centered, a relay starts the Autoscaler.

3. Hydraulic Presses

Of rigid box type construction, a line of three gap type hydraulic presses of ¾ to 4, 6 and 8 ton capacity, made by Greenerd Arbor Press Co., Nashua, N. H., are well-ribbed

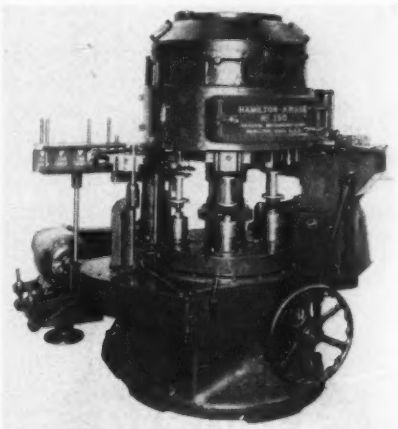


and are cast of hard Meehanite metal. Cylinder head is a separate unit, cast of the same metal, honed to size and equipped with steel piston with cast iron rings. Work table of same metal also is a separate unit and may be removed at any time for fixture attachment or replacement with a different type of table.

On standard models, ram is foot pedal or hand lever controlled. Relieving of pressure on either control returns ram to power stop. Pump is driven by a standard motor with V-belts. Few changes in machine make possible speed control of ram, coolant pump and fittings for broaching, electric latch type ram control, electric time lag of ram and safety electric dual hand control of ram.

4. Automatic End Seamer

Development of Lima-Hamilton Corp., 60 East 42nd St., New York 17, N. Y., is the Hamilton-Kruse model No. 150 high speed automatic end seamer for square and irregular



shaped cans. The four head unit has four round rollers on each end. In operation, cans remain stationary on the base plates during the seaming.

Machine is equipped with automatic body and end feeds, a complete set of seaming parts and its own motor and control. Features of machine include low speed heads, ease of adjustment and automatic lubrication. Capacity is 150 cans per minute.

5. Expansion Reamer

Exact-diameter holes to fit almost any size of soft metal bearings, including piston pins, can be reamed with the new single blade expansion reamer, announced by U. S. Reamer & Tool Corp., 124 South Isabel, Glendale 5, Calif. Reamer is provided with standard and oversize ring gages. After selecting the desired ring gage size, it is slipped over the reamer which is used in the usual way, but when the bearing has been reamed to proper size, the ring gage prevents further expansion.

Reamers are equipped with a tungsten carbide blade which produces a highly accurate finish. A guide sleeve

on the reamer expands independently, providing a support. As metal is removed, the sleeve is expanded to hold bearing in alignment. Tools are made in 32 sizes from 11/16 to 3 5/8-inches.

6. Industrial Trailer

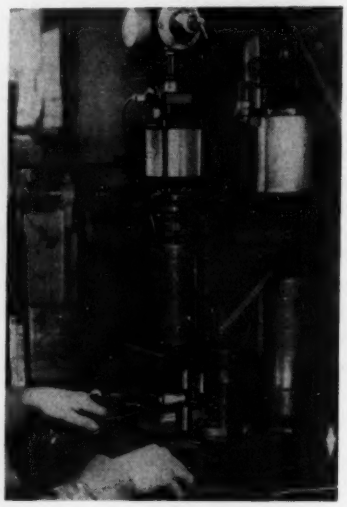
Of 15,000 pounds capacity, a caster steer all steel industrial trailer, built by Mercury Mfg. Co., 4140 South Halsted St., Chicago 9, Ill, achieves its high load capacity by use of three heavy duty swivel casters for steering control and two wide-faced load wheels. All five wheels have pressed-on rubber tires and are equipped with antifriction bearings.

Deck height of trailer is 19 inches and platform size may be varied, as may the type of hitch or coupler.

7. Impact Press

An air operated press of the medium heavy type for assembling, flanging, marking, forming, riveting, etc., is being manufactured by Bellows Co., 222 West Market St., Akron, O. Press uses a BM-10 integral valve air motor for compression of a heavy die type spring from which the ram force is derived. Impact pressure can be regulated from a few ounces to a maximum of 6500 pounds per square inch.

Ram shaft of solid steel has a



maximum clearance of 13 7/16 inches and a maximum movement of 1¼ inches with a vertical adjustment of 12 inches. Throat clearance from the center of the ram is 7 inches. Base width is 10 inches. Lugs are provided for bench mounting. Press may be equipped with electrically or manually operated controls and may be operated by either hand or foot.

8. Contact Wheel

Called Beltflex, a new contact wheel for abrasive belt polishing eliminates the necessity of using buff sections under abrasive belts, according to its manufacturer, Divine Brothers Co., 200 Seward Ave., Utica 1, N. Y. Its controlled balance and density and smoothly ground surface make it suitable for uniform belt tracking.

Wheel is offered in two degrees of density—E, offering great flexibility and G, offering flexibility with aggressive cutting action. Their flexibility allows for light contour work of high quality. Face widths and diameters for most requirements are available. It is recommended for use with jeans cloth abrasive belts.

9. Milling Mounting

Use of a new milling mounting, made by Rusnok Tool Works, 4840 West North Ave., Chicago 39, Ill., for its milling head, enables the milling attachment to be operated on either side of the overarm or direct-

(For more information, use the card following page 134.)

A Complete Warehouse Service for...
SHEETS • PLATES
STAINLESS STEEL
STRIP • SHAPES
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WIRE PRODUCTS • ALLOYS
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Adequate Stocks!
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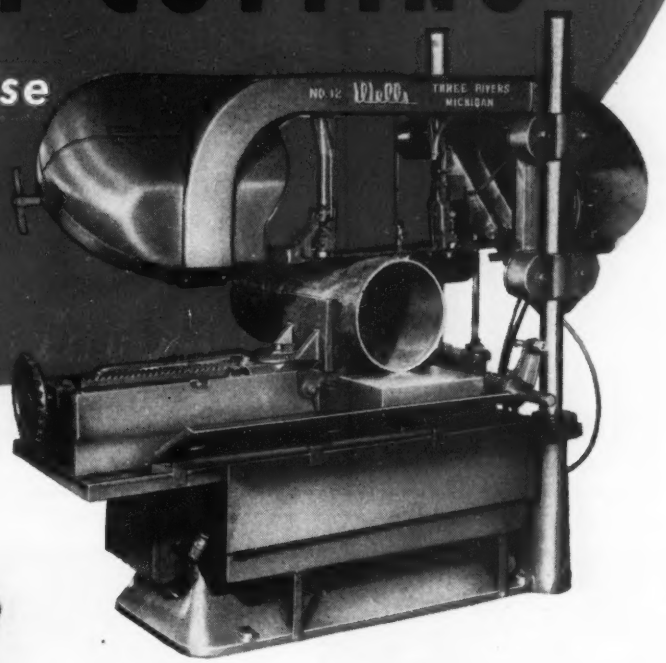
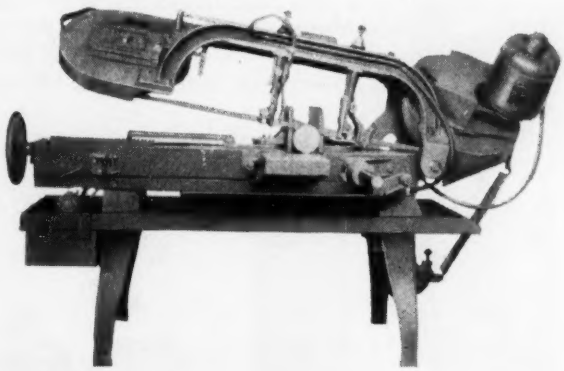
Now YOU CAN HAVE THE ADVANTAGES OF WET CUTTING

. . . with either of these popular WELLS METAL CUTTING BAND SAWS



• RIGHT — *The heavy duty Wells No. 12 with wet cutting system features an automatic cutting cycle and controlled blade pressure. Capacity is 12" x 16" rectangular; 12¾" rounds; die blocks, 12¾" deep, 16" wide, 18" clearance, bed to blade.*



• ABOVE — *The versatile Wells No. 8 with wet cutting system. Suitable for production or general utility. Capacity is 8" x 16" rectangular (5" x 24" with special guides); 8" rounds.*

BOTH the No. 8 and the new No. 12 Wells Metal Cutting Band Saws are now offered with complete, self-contained Wells wet cutting systems. Experience gained through wide use of this system on the No. 8 saw has proven that it will pay for itself quickly thru production cost reductions. Controlled flow of liquid into cutting area increases blade efficiency and permits safe use of higher f.p.m. cutting speeds. Get full details on this economical extra today and ask about a wet cutting system for your present No. 8 or No. 12 Wells Saw.

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Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

STOP WASTING DOLLARS ON OBSOLETE MATERIALS-HANDLING METHODS

TRADE MARK REGISTERED
KRANE KAR

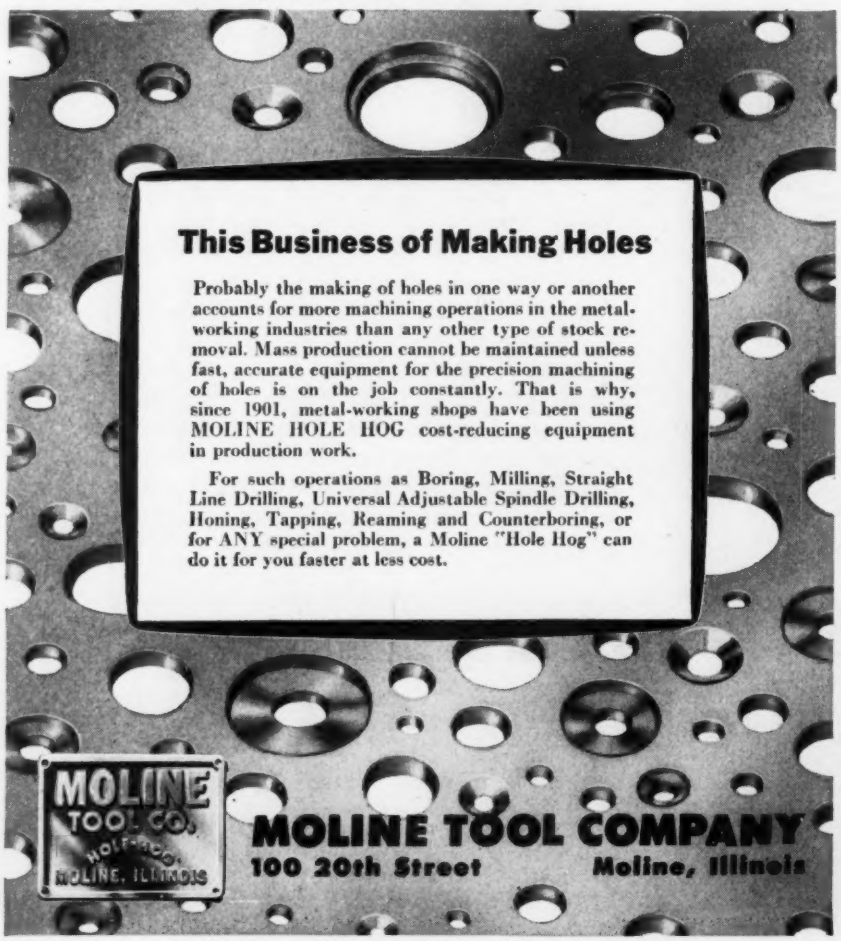
USERS: Chrysler, US Steel, DuPont, Ford, Bethlehem, Pullman-Standard, Lima Locomotive, General Motors, Basic Magnesium, Boeing, Lockheed, etc.

1½, 2½, 5 & 10 Ton Capacities

MODERNIZE! You can offset rising costs with ***KRANE KAR***, a *power-swinging* boom Crane that is small, compact, will travel to any part of yard or plant. Loads and Unloads freight cars, trucks, trailers... Tiers and Stores . . . ideal for Maintenance and Repairs. ***KRANE KAR*** will transport any load it can lift and with its *power-swinging, power-topping* features spot the load with fine precision at destination. ***KRANE KAR*** does the work of 6 or 8 men, handling materials at cost of 8c a ton (case histories on request).

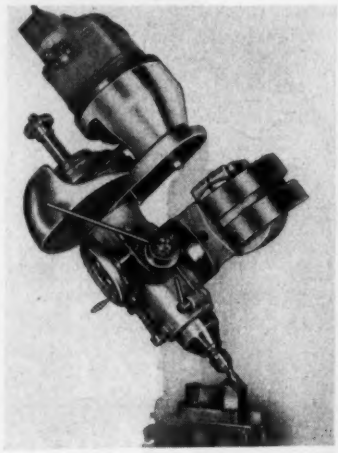
Pneumatic or solid rubber tires; 9 to 37 ft. booms or adjustable telescopic booms; gasoline or Diesel. Electric magnet, clamshell bucket, and other accessories available. *Ask for Bulletin #69.*

Silent Hoist & Crane Co.
849 63rd ST., BKLYN 20, N. Y.


This Business of Making Holes
Probably the making of holes in one way or another accounts for more machining operations in the metal-working industries than any other type of stock removal. Mass production cannot be maintained unless fast, accurate equipment for the precision machining of holes is on the job constantly. That is why, since 1901, metal-working shops have been using MOLINE HOLE HOG cost-reducing equipment in production work.
For such operations as Boring, Milling, Straight Line Drilling, Universal Adjustable Spindle Drilling, Honing, Tapping, Reaming and Counterboring, or for ANY special problem, a Moline "Hole Hog" can do it for you faster at less cost.
MOLINE TOOL CO.
MOLINE, ILLINOIS
MOLINE TOOL COMPANY
100 20th Street
Moline, Illinois

ly in front of the overarm. With the rail type mounting the milling attachment can be quickly and easily placed and rigidly locked in any position within a full 180 degree adjustment.

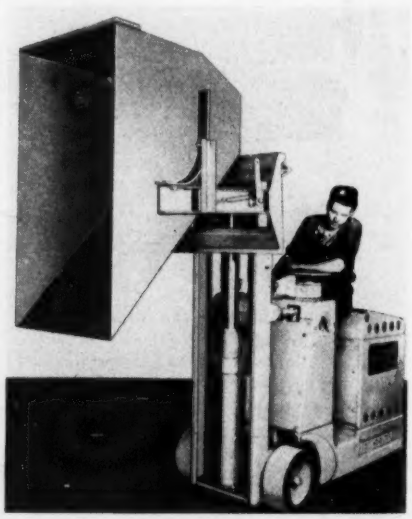
Mounting brackets are custom fitted to milling machines with round overarm within the range of 3 to 5



inches in diameter. They are adaptable to any new or old Rusnok milling attachment and provide a multiple quick changeover machine.

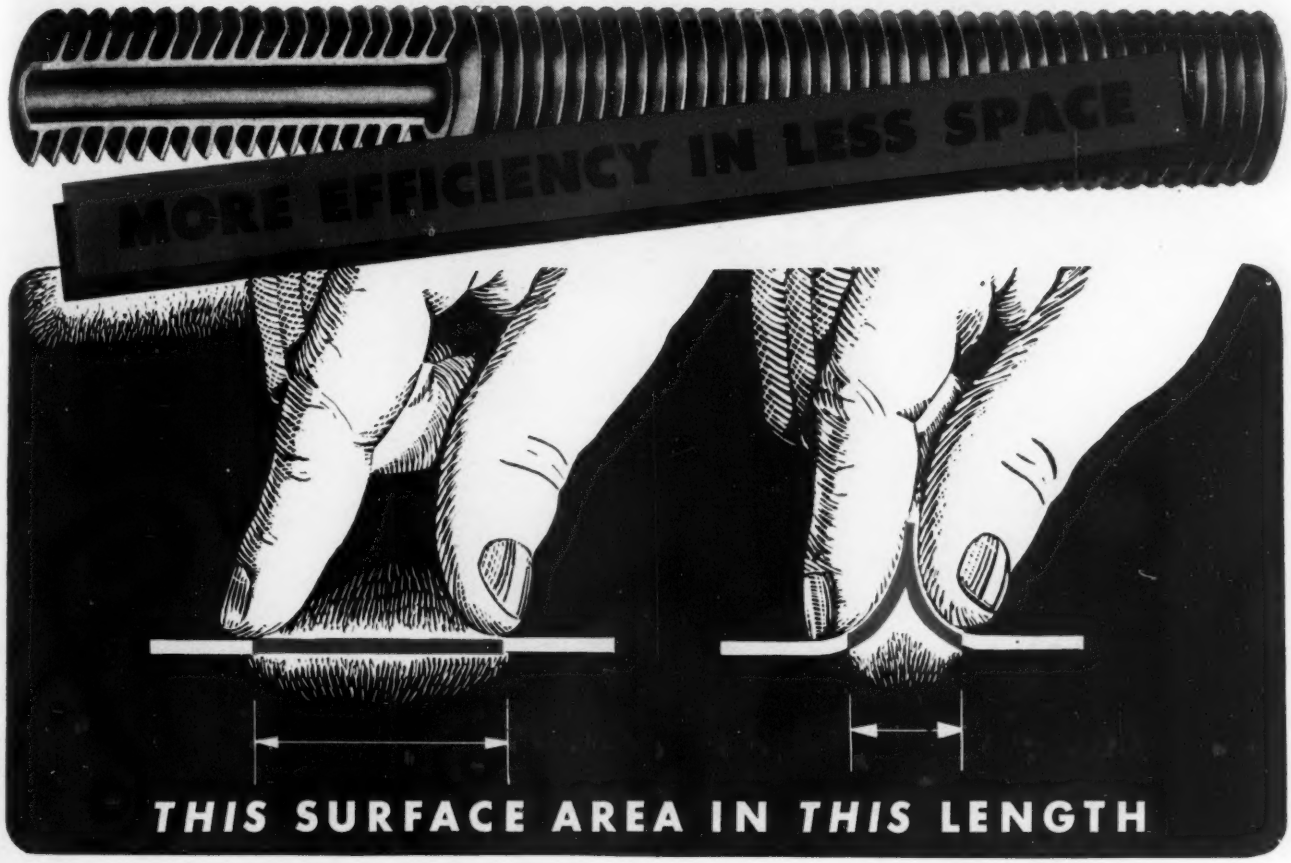
10. Fork Truck Hopper

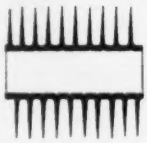
Applicable to all gas and electric power fork trucks made by Lewis-Shepard Products Inc., Watertown 72, Mass., is a self dumping hopper attachment introduced by the com-



pany for the handling of such bulk materials as coal, small castings, scrap metal, etc. Operation is completely controlled by the operator from his position on the truck. Hopper is emptied by releasing a holding latch and returns to normal position and latches when empty.

Constructed of steel and arc weld-





The act of pinching a piece of paper between your finger and thumb to bring it from a flat plane to a creased form illustrates the surface area comparison of plain tube versus Wolverine Trufin.

Each fin is mechanically pinched up from within the tube wall itself making that length of tube present a surface of greatly expanded area.

Here's a practical example: a foot of copper tube ½" I.D. has, roughly, 18 sq. in. of surface area. A foot of Wolverine Trufin—THE integral finned tube—of the same I.D. (9 fins per inch) has approximately 126 sq. in. of surface area.

Why burden equipment with a lot of unnecessary tube length when it is surface area you want?

Being a part of the tube itself the fins will withstand vibration and extreme temperature changes. Here is finned tube of high performance rating!

Trufin is available in a variety of diameters, alloys, fin heights and spacings.

Ask for engineering bulletins and specifications on Wolverine Trufin—THE integral finned tube.

WOLVERINE TUBE DIVISION
CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
INCORPORATED
MANUFACTURERS OF SEAMLESS NON-FERROUS TUBING
1411 CENTRAL AVENUE • DETROIT 9, MICHIGAN

Sculpture In Steel . . . Master Hobs—delicately detailed in HSC 422 alloy tool steel—preferred for its toughness and hardness—for its ability to retain shape, design, sharp delineation, under extreme pressures.

An unusual assortment of fine tool steels . . . in various sizes, shapes, finishes, conditions . . . available promptly from the conveniently located warehouses of Hoyland Steel Company. Complete technical assistance in solving tool steel problems. Hoyland Steel Catalog-Work Book available on request.

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This is What It Takes to Build

WISCONSIN *Air-Cooled* ENGINES

Trainloads of cast iron, bar steel, sheet steel and drop forgings; thousands of Timken roller bearings, magnetos, carburetors, fuel pumps and many other parts and materials . . . including 20,000 gallons of gasoline per month simply for factory test runs . . . that's what it takes to build Wisconsin Heavy-Duty Air-Cooled Engines!

But above all this *quantity* is the *quality* that is the final product . . . the Heavy-Duty Air-Cooled Wisconsin Engines that are serving Industry so dependably, in so many ways . . . as integral power units on a great variety of equipment, delivering "Most Hp. Hours" of on-the-job power service.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 14, WISCONSIN

ed, the hopper is offered in a range of capacities depending upon the job to be performed. It may be removed easily, to be replaced by standard forks or other attachments.

11. Sub-Press

Self aligning sub-presses of the type made by Paragon Metal Products, 844 West Adams St., Chicago 7, Ill., may be used with kick, arbor, air or punch presses, increasing the production capacity of all of them. Time consuming setups for staking,

piercing, bending, numbering, forming, etc., are eliminated as each operation can be tooled in a few seconds. Setup is left permanently in the press and when a change in operation is desired, the sub-press with the desired setup is substituted.

Line boring of ram and die holes assures perfect alignment, thus eliminating tool breakage due to misalignment. Flat surfaces are precision ground and ground and polished ram moves in an Oilite bearing. Alloy steel spring returns the ram rapidly.

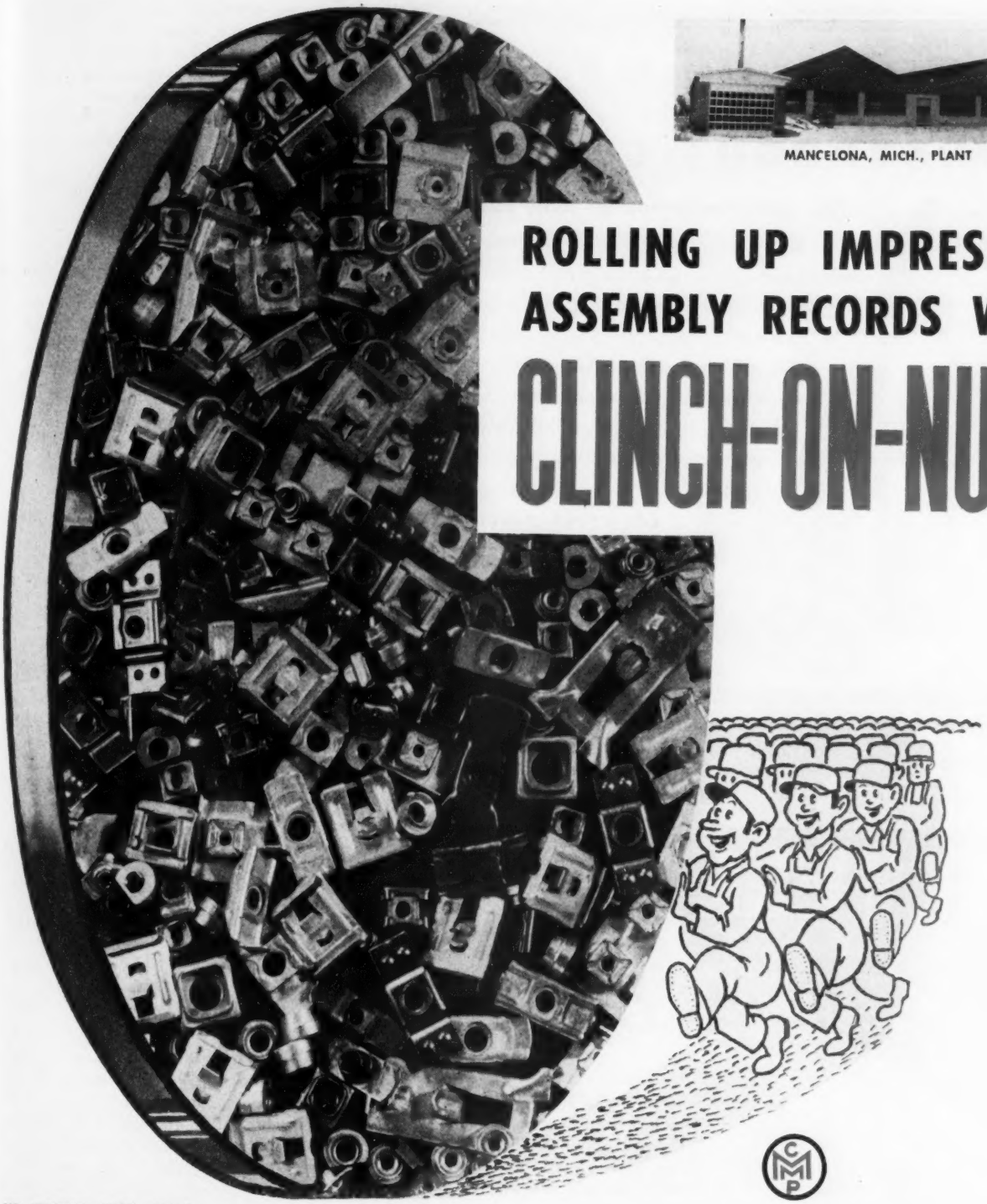
12. Gas Fired Furnaces

Gas fired furnaces using separately prepared protective atmospheres such as exogas, endogas, monogas or ammogas are announced by Westinghouse Electric Corp., Pittsburgh 30, Pa., for annealing, carburizing, drawing, spheroidizing, malleablizing, etc. Specific heat treating applications such as gas carburizing and dry cyaniding are possible.

Some of the types of gas fired

MANCELONA, MICH., PLANT

ROLLING UP IMPRESSIVE ASSEMBLY RECORDS WITH CLINCH-ON-NUTS



MT. CLEMENS, MICH., PLANT

Because our **CLINCH-ON NUTS** hold nuts in place during assembly, particularly in inaccessible spots, they have solved many assembly problems. Manufacturers of stoves, refrigerators, automobiles, stokers, kitchen utensils and many other products declare that our clinch-on nuts are the answer to a cost man's dreams. There is no end to the possible applications involving the use of our fasteners, clips, small metal stampings and other items in this field. If you have a problem concerning assembly headaches, our research and engineering departments will be glad to pitch in and help. To help you understand the variety of our fasteners, we have prepared an engineering handbook. You may have this book on request.

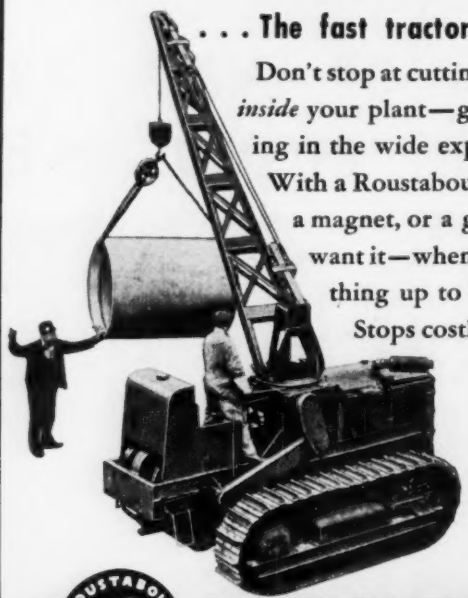
MOUNT CLEMENS METAL PRODUCTS CO.

MOUNT CLEMENS, MICHIGAN

Reduce Costs Outdoors as Well as In with

ROUSTABOUT CRANES

. . . The fast tractor-footed load hustlers



Don't stop at cutting materials handling costs *inside* your plant—go outside and start slashing in the wide expanses that eat up profits. With a Roustabout crane you've got a hook, a magnet, or a grab-bucket anywhere you want it—when you want it. Handles anything up to 7½ tons, uphill or down. Stops costly, manpower-wasting delays. Modernly engineered for years of overwork . . . mounted on crawler or wheel tractors. Write for the whole efficiency story now—to **Dept. H-3.**

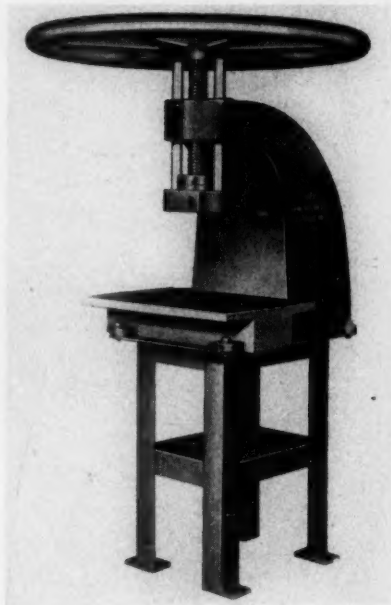
ROUSTABOUT CRANE

HUGHES-KEENAN CORPORATION
MANSFIELD, OHIO, U. S. A.
Load-Handling Specialists since 1904

furnaces available are: Cylindrical bell types for bright annealing of copper wire in coils or reels, of steel wire or strip, etc.; continuous pusher types of annealing, gas carburizing, hardening, malleablizing; continuous roller hearth furnaces; continuous conveyor furnaces for heat treating applications where light and medium weight parts are involved.

13. Tryout Press

Installed in the die shop on either bench or its own stand, a new tryout press, developed by General Mfg. Co., 6430 Farnsworth Ave., Detroit 11, Mich., enables the trying out of a die



without interrupting production on a regular production press.

A heavy, large diameter hand wheel, in combination with the high lead thread on the ram, enables safe movement of the punch in and out of the die at the rate of 1.6 inches per revolution. By whirling the wheel, 60,000 pounds pressure is available for test pieces after the die is complete.

14. V-Belt Clutch

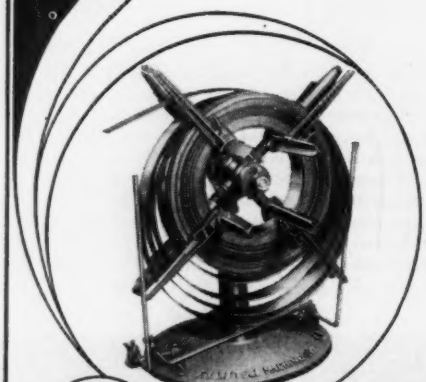
Designed for twin V-belts, the model 2DC Ball-Lok V-belt clutch, made by V-Belt Clutch Co., 3757 Wilshire Blvd., Los Angeles 5, Calif., supplies smooth starting on heavy loads, high speed operation, equalized belt pressure, long belt life and instant release. When clutch is set for idling position, belts ride on free-turning bearings of double slip-ring design. When it is engaged for driving position, belts are gripped by and ride up on the axially-moved pulley sidewalls.

Shafting force is applied to the wall

LITTELL AUTOMATIC CENTERING REELS

Cut Coil Costs

LITTELL Reels, Cradles, Winders, Feeders —are unexcelled in handling coil stock. They save time. One coil, hundreds of feet long, feeding steadily instead of dozens of short strips. They save material. A continuous ribbon. Economical dovetailing of blanks thruout entire length of coil.



Easy-running, ball-bearing, self-centering, adjustable stock supports—are among the features of Littell Reels. Plain or motor-driven Reels. Coil capacities up to 6,000 lbs. Cradles for coils up to 20,000 lbs. x 72" wide.

Request Bulletins

SPEED WITH SAFETY

F. J. LITTELL MACHINE CO.
4165 RAVENSWOOD AVE., CHICAGO 13, ILL.

UPSET AND FLANGED
"Standard" Tubing Techniques
INSERT SPOTWELDED
SWAGE TAPERED
UPSET AND FLARED
Apply the Versatility of "Standard" UPSET FORGING to Your Product
The upset forging facilities and techniques at "Standard" make possible this one-piece tube. Starting with a 3.4 O.D. by .134 wall tube, upset and flanged at one end to 5.12 O.D. by .520 thickness—tapered at opposite end to 2.240 O.D. and belled to 4.65 O.D. with .320 wall thickness—separate forgings and welding operations are unnecessary.
Specify STANDARD—It Pays!
THE STANDARD TUBE CO.
Detroit 28, Michigan
Welded Tubing
Fabricated Parts
STANDARDIZE with "STANDARD" — It Pays

of the open-channel sleeve. Shifter fork assemblies are available. Hardened steel pins or bronze lugs operating in the channel exert engaging pressure, yet have no contact when clutch is idling. No parts other than shifting elements are subject to rotating wear. The twin-belt model is rated at 5 to 10 horsepower.

15. Tool Grinder

Toolroom operations such as grinding small and medium sized cylindrical work, form grinding, sharpening milling cutters, reamers and similar tools may be done on the redesigned No. 13 universal and tool grinding machine built by Brown & Sharpe Mfg. Co., Providence 1, R. I. Machine is driven by three constant speed mo-

tors—1 horsepower for wheel spindle, 1/4-horsepower for table and 1/6-horsepower for headstock. Both plain and antifriction bearing wheel spindle units are available.

Three wheel spindle speeds are provided and full 5000 surface feet per minute is available for a 7-inch wheel. Six table speed rates, from 7-3/4 to 100 inches per minute, are selected from front of machine. Two rates of hand table travel, 6-1/4 and 1/4-inch per revolution of hand wheel, are offered. Headstock provides four work speeds—106 to 525 revolutions per minute. All lubrication is automatic.

16. Pneumatic Grinder

Free speeds of 6000 and 8000 revolutions per minute are offered with the model M-401 light weight vertical grinder, sander and wire brushing tool, manufactured by Master Pneumatic Tool Co. Inc., Orwell, O. With industrial hard chromium on all important wearing parts, the magnesium-housed tool has a safety governor control and an "on and off" throttle control.

Tool may be used for grinding of welds, removal of seams, gates, risers, etc., and removal of scale, rust and paint by wire brushing. Low slung grip handles eliminate gyroscopic action. Lubrication, from large oil reservoir, is automatic. Model with lower speed uses a 7-inch sanding pad, while faster model uses a 5-inch pad. Both use a 4-inch wire brush.

DEVELOPED BY . . .

17. Ohio Nut & Bolt Co., Berea, O., double-ball projection welded handle screw for various uses. They will be available in thread diameters of No. 8, 10, ¼, 5/16 and ⅜-inches with 3-inch long ball handles.

18. New Method Steel Stamps Inc., Detroit 7, Mich., die inserts for marking or decorating parts produced by injection molding and die casting. Assembled in a die it produces raised letters.

19. Logansport Machine Co. Inc., Logansport, Ind., model 7025 4-way hydraulic valve which provides latching or free control of double acting hydraulic cylinders. It is offered in various port sizes for operation at pressures to 1500 pounds per square inch.

20. Holub Industries Inc., Sycamore, Ill., No. 3 solderless and tapeless wire connector for 108 individual wire combinations on No. 14-18 wire. It may be used for all types of wiring and has Underwriters' Laboratories approval.

21. Peck & Harvey, Chicago 45, Ill., Ammo-Fume dry process reproduction unit for use in drafting room, shop, lab or office. Clear, sharp, positive prints with black, red, blue, yellow or sepia lines and images are produced up to 42 inches wide.

22. Western Lithograph Co., Los Angeles 54, Calif., E-Z code wire markers, self-adhesive identification labels. Supplied in card form, each label is quickly and easily applied.

23. Kano Laboratories, Chicago 1, Ill., a hard, dry rustproof coating which is applied by dipping, spraying or brushing and dries in 15 minutes. Tough, flexible and nonporous, it is removed with a petroleum solvent, although this is not necessary before painting.

24. Sheffield Corp., Dayton 1, O., Micronaire air gage for accurately measuring the fineness of fibers of various types. Direct readings are made from a scale calibrated in units standard for the fiber being checked.

25. Herman H. Sticht Co. Inc., New York 7, N. Y., a Megohmer insulation tester which serves as an insulation tester, ohmmeter, alternating and direct current voltmeter. Model B-6 instrument uses two No. 6 dry cells as power source, stepped up to 500 volts by a vibrator-transformer circuit.

26. Grip-Nut Co., Chicago 4, Ill., improved semifinished, one piece self-locking Gripco lock nut. It has a considerably greater flat area depression of threads, giving greater sustained holding power.

27. Airmatic Valve Inc., Cleveland 3, O., noncorrosive hand and foot controlled three and four-way valves. Either type is available in ¼-inch size for installation on continuous operated machines for control of single and double acting cylinders.

28. Rack Engineering Co., Pittsburgh, Pa., perforated steel box for washing and degreasing operations. Manufactured in six standard sizes, it is constructed of heavy duty steel with perforations in top and bottom.

29. Univis Lens Co., Dayton 1, O., Safe-T-Vis safety goggle of an allyl casting resin. Goggles are offered in four styles and in a selection of sizes.

30. General Electric Corp., Schenectady 5, N. Y., line of high accuracy thermocouple wires for measurement of temperatures in industrial processes and laboratories.

31. Gairing Tool Co., Detroit, Mich., an improved E-Con-O-Mill face mill with all clearance angles finish ground and protected by a plastic coating. Carbide tips are increased to ⅝-inch in width, extending full width of blade.

32. All-State Welding Alloys Co. Inc., White Plains, N. Y., No. 4 fully machinable cast iron electrode with nickel core. Welds are made at amperages in the 45-140 range. It can be used with either alternating or direct current.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

STEEL PRODUCTION—Pending definite indication as to when the coal strike will end, steel producers continue to curtail operations with the trend likely to accelerate this week, depending, of course, on important developments toward settlement of the mine labor dispute.

Reduction in steel output was more general last week. For the first time since the miners' walkout three weeks ago, the work stoppage began to be really felt. However, to date steel output has not been crippled. In fact, the loss in production actually had been less than 200,000 tons up to the end of last week. Weekly production had been running at a rate of 1,750,000 tons prior to the strike. Last week output was estimated around 1,590,000 tons. Production of pig iron and coke has been hit much more severely than steel, and this will be reflected shortly in steel operations.

INGOT OPERATIONS—Expectations are the national ingot rate will fall below 60 per cent within 10 days unless the coal strike ends this week. Last week the national rate was estimated at 88½ per cent of capacity, down 4½ points from the preceding week, and off 7½ points since the start of the coal strike.

STEEL SUPPLY—Consumers are beginning to feel the effects of the coal strike. Curtailment in rail shipments is adding to the stringency in steel supply. Most producers think a reduction in consumer quotas for second quarter cannot be avoided, though prompt settlement of the coal strike might make it possible to overcome present handicaps. Shrinkage in raw steel supply is beginning to affect finishing mill operations and this trend will accelerate over the next week with corresponding drop in shipments to consumers.

DEFENSE DEMANDS—Feeler inquiries for national defense requirements are being received by steelmakers. Strong demand for alloy and special steels is being entertained currently but only a part of this is due to expanded requirements of the armed services.

Alloy steel deliveries extend into August and additional electric furnace capacity has been placed in operation to cope with demand. Steelmakers anticipate rising volume of defense demand, especially after midsummer. One producer is considering holding a quota in reserve beginning July 1 for military needs.

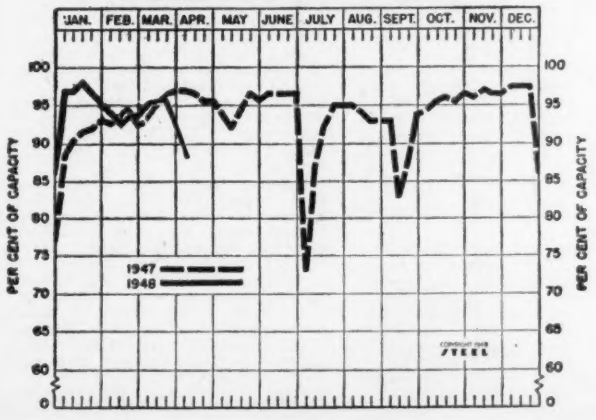
Imposition of mandatory government controls on materials distribution, prices and wages is expected in event the tense international situation develops into a full-blown emergency. As reported in STEEL a week ago adoption of mandatory controls in the near future is given a 50-50 chance in Washington. Currently, voluntary allocation is making progress. Last week the car steel program was cleared by the Justice Department, and several industry committee hearings were held. On Apr. 21 steel warehousemen will meet with the Office of Industry Co-operation to explore the feasibility of bringing distributors into the voluntary allocations program with a view to aiding small buyers overcome their current and prospective steel procurement difficulties.

PRICES—Steel prices are stable and no revisions appear in immediate prospect. Expectations are price developments will hinge on the outcome of steel wage negotiations.

Lake Superior iron ore prices for the 1948 lake shipping season have been established through sales by two leading shippers at levels 65 cents per ton higher on all grades.

Composite arithmetical price averages, compiled by STEEL, held unchanged last week and compared with those for the like 1947 week as follows: Finished steel, $81.14 and $69.82; semifinished steel, $68.72 and $32.49; steelmaking pig iron, $40.25 and $32.49; steelmaking scrap $40.25 and $35.58. STEEL's finished steel weighted composite was 3.57435c for March compared with 3.54027c for February.

STEELWORKS OPERATIONS



DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

	Week Ended Apr. 3	Change	Same Week 1947	Same Week 1946
Pittsburgh	94	— 1.5	99.5	68.5
Chicago	94	— 1	95	92
Eastern Pa.	76	— 8	90.5	84
Youngstown	83	—15	91	78
Wheeling	93.5	+ 1	93.5	90.5
Cleveland	91.5	— 3	96	96.5
Buffalo	85	None	88.5	90.5
Birmingham	74	—23.5	99	95
New England	77	None	94	92
Cincinnati	96	None	92	77
St. Louis	82.5	+ 5	75	49.5
Detroit	104	None	90	80
Estimated national rate	88.5	—4.5	97	81.5

Based on weekly steelmaking capacity of 1,802,476 net tons for 1948; 1,749,928 tons for 1947; 1,762,381 tons for 1946.

COMPOSITE MARKET AVERAGES

Arithmetical Price Composites*

	Apr. 3	Mar. 27	Month Ago Mar. 1948	Year Ago Apr. 1947	5 Years Ago Apr. 1943
Finished Steel	$81.14	$81.14	$81.14	$69.82	$56.73
Semifinished Steel	68.72	68.72	68.72	52.10	36.00
Steelmaking Pig Iron	39.31	39.31	39.34	32.49	23.00
Steelmaking Scrap	40.25	40.25	40.21	33.94	19.17

FINISHED STEEL WEIGHTED COMPOSITE†

Mar. 1948	3.57435c
Feb. 1948	3.54027c
Mar. 1947	3.10998c
Mar. 1943	2.43678c

* **STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide base prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (rerolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading basing points), and on Steelworks Scrap (No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composite, dollars per net ton; pig iron and scrap, gross ton.

† **FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, base prices, weighted by actual monthly shipments of following products, representing 82 per cent of total steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute; Structural shapes; plates; standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. February and March figures are preliminary.

COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton; others dollars per gross ton.

Finished Materials

	Apr. 3, 1948	Mar., 1948	Jan., 1948	Apr., 1947
Steel bars, Pittsburgh	2.90c	2.90c	2.90c	2.60c
Steel bars, del. Philadelphia	3.356	3.356	3.348	2.98
Steel bars, Chicago	2.90	2.90	2.90	2.60
Shapes, Pittsburgh	2.80	2.80	2.80	2.50
Shapes, del. Philadelphia	2.968	2.968	2.966	2.64
Shapes, Chicago	2.80	2.80	2.80	2.50
Plates, Pittsburgh	2.95	2.95	2.95	2.65
Plates, del. Philadelphia	3.19	3.19	3.186	2.85
Plates, Chicago	2.95	2.95	2.95	2.65
Sheets, hot-rolled, Pittsburgh	2.80	2.80	2.80	2.50
Sheets, cold-rolled, Pittsburgh	3.55	3.55	3.55	3.20
Sheets, No. 10 galv., Pittsburgh	3.95	3.95	3.93	3.55
Sheets, hot-rolled, Gary	2.80	2.80	2.80	2.50
Sheets, cold-rolled, Gary	3.55	3.55	3.55	3.20
Sheets, No. 10 galv., Gary	3.95	3.95	3.93	3.55
Strip, hot-rolled, Pittsburgh	3.05	3.05	2.80	2.50
Strip, cold-rolled, Pittsburgh	3.80	3.80	3.55	3.20
Bright basic, bess. wire, Pittsburgh	3.775	3.775	3.695	3.425
Wire nails, Pittsburgh	5.20	5.20	4.67	4.125
Tin plate, per base box, Pittsburgh	$6.70	$6.70	$6.70	$5.75

Semifinished

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$53.57	$44.64
Slabs, Pittsburgh, Chicago	45.00	45.00	40.18	37.506
Rerolling billets, Pittsburgh	45.00	45.00	40.18	37.506
Wire rod 7/32 to 1/4-inch, Pitts.	3.175c	3.175c	3.10c	2.55c

Pig Iron

	Apr. 3, 1948	Mar., 1948	Jan., 1948	Apr., 1947
Bessemer, del. Pittsburgh (N.&S. sides)	$40.996	$40.996	$40.379	$34.83
Basic, Valley	39.00	39.00	38.40	33.00
Basic, eastern del. Philadelphia	42.004	42.004	41.372	35.52
No. 2 fdry., del. Pgh. (N.&S. sides)	40.496	40.496	39.879	34.33
No. 2 fdry., del. Philadelphia	42.504	42.504	41.871	36.02
No. 2 foundry, Chicago	39.00	39.00	38.60	33.00
No. 2 foundry, Valley	39.50	39.50	36.50	33.50
Southern No. 2, Birmingham	37.88	37.88	34.88	29.28
Southern, No. 2, del. Cincinnati	42.23	41.857	37.74	34.15
Malleable, Valley	39.50	39.50	38.90	33.50
Malleable, Chicago	39.50	39.50	39.10	33.50
Charcoal, low phos., fob Lyles, Tenn.	55.00	55.00	50.00	40.50
Ferromanganese, fob cars, Pittsburgh	151.00	151.00	151.00	140.25

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$40.25	$40.25	$40.30	$35.81
Heavy melt. steel, No. 2, E. Pa.	39.00	39.00	41.30	33.25
Heavy melt. steel, No. 1, Chicago	39.00	38.875	39.05	32.75
Heavy melt. steel, No. 1, Valley	40.25	40.25	40.04	34.56
Heavy melt. steel, No. 1, Cleveland	39.75	39.75	39.75	34.06
Heavy melt. steel, No. 1, Buffalo	43.00	44.00	43.30	34.25
Rails for rerolling, Chicago	49.50	49.625	60.00	38.25
No. 1 cast, Chicago	66.00	66.00	63.50	42.50

Coke

Connellsville, beehive furnace	$12.50	$12.50	$12.50	$9.06
Connellsville, beehive foundry	14.875	14.875	14.60	10.375
Chicago, oven foundry, del.	19.25	19.25	19.19	16.10

FINISHED AND SEMIFINISHED IRON STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $90-$95 per gross ton. Forging quality $46 per net ton, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56 per gross ton.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Buffalo, Birmingham, $45 per net ton; Cleveland, $47 per net ton; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

Forging Quality Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $54 per net ton.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66 per gross ton.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Youngstown, $60 nom., per net ton; sales in open market $95-105 per gross ton.

Skelp: Pittsburgh, Youngstown, 2.90c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69-70 per net ton; some sellers quoting up to $120 per gross ton.

Wire Rods: Pittsburgh, Chicago, Birmingham, 7/32 to 1/4-inch, inclusive, $2.80-3.55 per 100 lb. 5/16 to 47/64-in., inclusive, $2.75, Cleveland; Galveston, $2.95; Worcester, $2.90-2.95. San Francisco (base del.), $3.5245.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, base, 20 tons one size, 2.90c; Detroit, del., 3.06c; eastern Mich., 3.13c; New York, del., 3.392c; Phila., del., 3.356c; San Francisco (base, del.), 3.6345-3.95c; Los Angeles (base, del.), 3.629-3.86c; Seattle, 3.8375-3.85c, base.

Rail Steel Bars: Same basing points as merchant carbon bars, except base is 10 tons. Prices upon application.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.30c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lb., 3.55c; Detroit, del., 3.71c; Toledo, 3.78c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base 4.10c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.75c; San Francisco (base, del.), 3.3345c; Los Angeles (base, del.), 3.329c; Seattle, 3.88c-4.18c base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo. Prices upon application.

Iron Bars: Single refined, Pittsburgh 7.15c-†7.70c, double refined 8.00-†9.75c; Pittsburgh, staybolt, 8.85c-†11.25c.

† Hand puddled.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Ashland, Ky., base, 2.80c; Detroit, del., 2.96c; eastern Mich., del., 3.03c; Philadelphia, del., 3.04c; New York, del., 3.172c; Los Angeles (base, del.), 3.544c; San Francisco, (base, del.), 3.5495c, (Alan Wood Steel Co., Conshohocken, Pa., quotes 4.20c, Sparrows Point equivalent).

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.55c; Granite City, 3.65c; Detroit, del., 3.71c; Eastern Mich., del., 3.78c; New York, del., 4.042c; Philadelphia, del., 4.006c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Canton, Middletown, 3.95c; Kokomo, 4.55c; Youngstown, 3.95-4.45c; Granite City, 4.35c; New York, del., 4.322c; Philadelphia, del., 4.19c; Los Angeles (base, del.), 4.724c; San Francisco (base, del.), 4.7295c.

Corrugated Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham base, 4.05c.

Culvert Sheets, No. 16 flat: (Based on 5 cent zinc; corrugated 10 cents extra) Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.55c; copper-iron or pure iron, 4.90c; Granite City 5.00c and 5.35c, respectively; copper alloy, 4.90c, Kokomo. Los Angeles (base, del.), 5.344c; San Francisco (base, del.), 5.3495c.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: Pittsburgh, 7.50c.

Stainless-Clad 20%, annealed and pickled: Pittsburgh, Washington, No. 304, 22.00c; No. 410, 20.00c; No. 430, 20.50c; No. 446, 27.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 4.05c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Middletown, 3.95c; Youngstown 3.95c-4.45c; Granite City, 4.05c; Detroit, del., 4.11c; eastern Mich., 4.18c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, 4.80c-5.30c; Chicago, Gary, 4.80c; Granite City, Ill., 5.25c; Kokomo, Ind., 4.90c. Electrical: Pittsburgh, 5.30c-5.80c; Chicago, Gary, 5.30c; Granite City, Ill., 5.75c; Kokomo, Ind., 5.40c. Motor: Pittsburgh, 6.05-6.80c; Chicago, Gary, 6.05c; Granite City, 6.50c.

Dynamo: Pittsburgh, 6.75c-7.00c; Granite City, 7.20c. Transformer 72, 7.25-8.25c; 65, 7.95-9.20c; 58, 8.65-9.90c; 52, 9.45c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, 2.80c-3.30c; Chicago, Gary, Birmingham, Youngstown, base, 2.80c; Detroit, del., 2.96c; eastern Mich., del., 3.03c; San Francisco (base, del.), 3.605c; Los Angeles (base, del.), 3.60c.

Cold-Rolled Strip: 0.25 carbon and less: Pittsburgh, 3.55c-4.05c; Cleveland, Youngstown, 3.55c-3.85c; Chicago base, 3.65c; Detroit, del. 3.71c; eastern Mich., 3.78c; Worcester, base, 3.75c-4.45c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 5.05c; over 0.60 to 0.80, 5.65c; over 0.80 to 1.05, 7.15c; over 1.05 to 1.35, 9.45c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., per base box of 100 lb, 1.25 lb coating $6.60, 1.50 lb coating $6.80; Granite City, Birmingham, Sparrows Point, 1.25 lb coating $6.70, 1.50 lb coating $6.90.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., per base box of 100 lb, 0.25 lb tin, $5.80; 0.50 lb tin, $6.00; 0.75 lb tin $6.20; Granite City, Birmingham, Sparrows Point, $5.90, $6.10, $6.30, respectively.

Can Making Black Plate: Pittsburgh, Gary, Warren, O., per base box of 100 lb, 55 to 70 lb basis weight, $5.20; 75 to 95 lb basis weight, $5.10; 100 to 128 lb basis weight, $5.20.

Holloware Enameling Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage, 4.75c per lb; Granite City, Birmingham, Sparrows Point, 4.85c per lb.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, per base box of 100 lb, $5.90; Granite City, Birmingham, Sparrows Point, $6.00.

Roofing Ternes: Pittsburgh, per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.95c; Coatesville, 3.45c; Claymont, 3.65c; Geneva, Utah, (base, del.), 3.125c; Det., del., 3.21c; New York, del., 3.322c; Phila., del., 3.19c; Boston, del., 3.423c; St. Louis, del., 3.269c; San Francisco and Los Angeles, del., 3.693c for sizes and grades produced at Geneva, 3.76c for sizes and grades produced at Fontana, Calif.
(Central Iron & Steel Co., Harrisburg, Pa., 4.75c, basing points.)

Floor Plates: Pittsburgh, Chicago, Cleveland, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.80c-4.137c; Coatesville, 4.80c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 24.00c. Pittsburgh, Washington, Coatesville, Pa., 20% stainless-clad, base prices including annealing and pickling; No. 304, 24.00c; No. 410, 22.00c; No. 430, 22.50c; No. 446, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.80c; New York, del., 3.088c; Phila., del., 2.968c; Geneva, Utah (base, del.), 2.975c; Los Angeles (base, del.), 3.41-3.474c for sizes produced at Torrance, Calif., beyond sizes at Geneva; Los Angeles and San Francisco, del., 3.543c for sizes produced at Geneva; San Francisco, del., 3.41c for sizes produced at Fontana, Calif.

Alloy Structural Shapes: Pittsburgh, Chicago, 3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds.)

Wire to Manufacturers in carloads

Bright, basic or bessemer	*$3.55–4.00
Basic MB Spring (except Birm.)	**$4.95
Upholstery Spring (except Birm.)	†$4.60

Wire Products to Trade in carloads

Wire, Merchant Quality	
Annealed (6 to 8 base)	††$4.20
Galvanized (6 to 8 base)	††$4.65

(Fob Pittsburgh, Chicago, Duluth, Birmingham, per base column).

Nails	
Standard, cement-coated, galvanized	‡94
Staples, polished and galvanized	‡‡94
Woven fence, 15½ gage and heavier	§100
Barbed wire, 80-rod spool	§§113
Fence Posts (with clamps)	107
Bale ties, single loop	§99

* Worcester, $3.65; Duluth, $3.60, base; San Francisco (base, del.), $4.56, bright basic only.

** Worcester, $5.05; Duluth & Trenton, N.J., $5.20 (bright only); San Francisco (base del.) $5.9845.

† Worcester $4.70; Duluth and Trenton, N. J., $4.85, base. San Francisco (base, del.) $5.6345 black upholstery.

†† One producer quotes 25 cents higher at Birmingham and Chicago; Worcester $4.30, annealed; $4.75, galvanized. Duluth $4.20, annealed, $4.65, galvanized, San Francisco (base, del.) $5.21, annealed, $5.66 galvanized.

‡ Cols. 108 and 114 also quoted Pittsburgh; Worcester 100; Cleveland 97; San Francisco (base, del.) 115.

‡‡ Cols. 108 and 114 also quoted Pittsburgh; Worcester 100, San Francisco (base del.) 115.

§ San Francisco (base del.) 123.

§§ San Francisco (base del.) 133.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.10 per 100 lb; light rails (rail steel), Williamsport, Pa., Pittsburgh prices upon application.
Relaying, 60 lb and over fob warehouse $60-$65 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates, $3.65 per 100 lb, fob mill; $3.40 base, Seattle; $3.80 base, Pittsburg, Calif. Splice bars $3.85 per 100 lb, fob mill. Standard spikes, 4.85c; screw spikes, 6.75c. Axles, 4.50c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

	Butt Weld			Butt Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	44½	17	1	52½	36½
¼	44½	21½	1¼	53	37
⅜	41	17	1½	53½	37½
½	47	29½	2	54	38
¾	50	33½	2½ & 3	54½	38½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	44½	28	44	27½	43½	27
2½ & 3	48½	32	47	30½	46½	30
3½-6	50½	34	49	32½	48½	32

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Butt Weld	In.	Butt Weld
⅛	43½	1	51½
¼	43½	1¼	52
⅜	40	1½	52½
½	46	2	53
¾	49	2½ & 3	53½

In.	Lap Weld	Elec. Weld	Seamless
2	43½	43	42½
2½ & 3	47½	46	45½
3½-6	49½	48	47½
8	50½	50	49½
10	50	49½	49
12	49	48½	48

Standard Wrought Iron Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh.

	Butt Weld			Lap Weld	
In.	Blk.	Gal.	In.	Blk.	Gal.
½	+11	+35	2	−1½	+20
¾	+ 1½	+25	2½-3½	−4	+16
1 and 1¼	− 4	+16½	4	−8	+10½
1½	− 9½	+13	4½-8	−6	+12
2	−10	+12½			

Boiler Tubes: Net base prices per 100 ft. fob Pittsburgh, in carload lots, minimum wall thickness, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D.		Hot	Cold	Hot	Cold
Sizes	B.W.G.	Rolled	Drawn	Rolled	Drawn
1"	13	....	$12.46	$11.51	$11.51
1¼"	13	....	14.76	11.48	13.64
1½"	13	$14.00	16.47	12.69	15.22
1¾"	13	15.92	18.74	14.43	17.31
2"	13	17.84	20.99	16.17	19.39
2¼"	13	19.88	23.40	18.02	21.62
2½"	12	21.90	25.77	19.86	23.80
2¾"	12	23.99	28.21	21.75	26.06
3"	12	25.42	29.90	23.05	27.63
3¼"	12	26.68	31.40	24.18	29.00
3½"	11	31.06	36.55	28.16	33.77
3½"	11	33.35	39.26	30.23	36.27
4"	10	41.40	48.70	37.53	44.99
4½"	9	54.87	64.58	....	....
5"	9	63.52	74.74	....	....
6"	7	97.51	114.73	....	....

Pipe Cast Iron: Class B, 6-in. and over $79.50 per net ton, Birmingham; $84.50, Burlington, N. J.; $91.12, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 19c per cwt in carlots, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step, plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	45 off
9/16 and ⅝ x 6-in. and shorter	46 off
¾-in. and larger x 6-in. and shorter	43 off
All diameters longer than 6-in.	41 off
Tire bolts	35 off
Step bolts	43 off
Plow bolts	54 off
Lag bolts	
All diameters 6 in. and shorter	46 off
All diameters longer than 6 in.	44 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
7/16-in. and smaller	46 off	....
½-in. and smaller	....	44 off
½-in.-1-in.	44 off	....
⅝-in.-1-in.	....	43 off
1⅛-in.-1½-in.	42 off	41 off
1⅝-in. and larger	....	35 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	53 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	48 off
¾, ⅞, & 1 x 6 and shorter	44 off

Square Head Set Screws

Upset 1-in. and smaller	57 off
Headless, ¼-in. and larger	40 off
No. 10 and smaller	52 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural ½-in. and larger	5.65c
Lebanon, Pa.	.5.65c plus 19c per cwt in cl., 26c lcl.
7/16-in. and under	55 off
Lebanon, Pa.	.55 off plus 19c per cwt in cl., 26c lcl.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl — $1-$2 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00-17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base Per lb
18.00	4	1	...	82.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.00	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
408	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	39.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442, 443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
†501	9.00	13.00	17.50	13.00	18.50
†502	10.00	14.50	18.50	14.50	19.50
‡STAINLESS CLAD STEEL (20%)					
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

† Low chromium. ‡ Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., base	$40.00	$40.50	$41.00	$41.50
Newark, N. J., del.	42.208	42.708	43.208	43.708
Brooklyn, N. Y., del.	....	44.10	44.60	....
Philadelphia, del.	42.004	42.504	43.004	43.504
Birmingham, base	35.88†	36.38†	....	....
Cincinnati, del.	....	42.23	....	....
Buffalo, base	40.00†	40.00†	40.50†	41.00
Boston, del.	47.776	47.776	48.276	....
Rochester, del.	42.22	42.22	42.72	43.22
Syracuse, del.	43.025	43.025	43.525	44.025
Chicago, base	38.50	39.00	39.50	40.00
Milwaukee, del.	40.08	40.58	41.08	41.58
Muskegon, Mich., del.	....	43.60	44.10	....
Cleveland, fob furnace	38.50†	39.00†	39.50†	40.00
Akron, del.	40.50	41.00	41.50	42.00
Duluth, base	39.00	39.50	40.00	40.50
Erie, Pa., base	38.50	39.00	39.50	40.00
Everett, Mass., base	....	45.00	45.50	....
Granite City, Ill., base	39.50	40.00	40.50	....
St. Louis, del.	40.25	40.75	41.25	....
‡Neville Island, Pa., base	39.00	39.50	39.50	40.00
Pittsburgh, del., N.&S. Sides	39.996	40.496	40.496	40.996
Provo, Utah, base	39.00	39.50	....	....
Seattle, Tacoma, Wash., del.	....	46.63	....	....
Portland, Oreg., del.	....	46.63	....	....
Los Angeles, San Francisco	46.13	46.63	....	....
Sharpsville, Pa., base	39.00	39.50	39.50	40.00
Steelton, Pa., base	40.00	40.50	41.00	41.50
Struthers, O., base	39.50	....	....	....
Swedeland, Pa., base	45.00	45.50	46.00	46.50
Toledo, O., base	38.50	39.00	39.50	40.00
Cincinnati, del.	42.70	43.20	....	....
Youngstown, O., base	39.00	39.50	39.50	40.00
Mansfield, O.	42.57	43.07	43.07	43.57

† Republic Steel Corp. quotes $3 a ton higher at Birmingham, effective Jan. 1, 1948; Republic quotes $4.50 higher for No. 2 foundry and malleable and $4 higher for basic at Buffalo, and $1.25 higher at Cleveland, effective on shipments during week ended Apr. 4.

‡ To Neville Island base add: 79.2c for McKees Rocks, Pa., $1.212 Lawrenceville, Homestead, McKeesport, Monaco; $1.788 Oakmont; $1.596 Verona; $1.788 Brackenridge; 99.6c to Ambridge and Aliquippa.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base)....$49.50
6.51-7.00..$50.75 9.01- 9.50. 57.00
7.01-7.50.. 52.00 9.51-10.00. 58.25
7.51-8.00.. 53.25 10.01-10.50. 59.50
8.01-8.50.. 54.50 10.51-11.00. 60.75
8.51-9.00.. 55.75 11.01-11.50. 62.00

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron Si 14.01-14.50%, $77.50, Jackson, O.; $78.75, Niagara Falls; $78 open-hearth and $79 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.05% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.....$55.00 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $39.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $46.00. Philadelphia, $48.592, delivered. Intermediate phosphorus, Central furnace, Cleveland, $42.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace..	$12.00-$13.00
Connellsville, foundry..	14.00- 15.75
New River, foundry...	12.50
Wise county, foundry..	11.15
Wise county, furnace..	10.65

Oven Foundry Coke

Kearney, N. J., ovens.	$18.75
Chicago, outside del...	18.00
Chicago, del.	19.25
Terre Haute, ovens....	18.50
Milwaukee, ovens	18.75
New England, del.	20.40-20.45
Birmingham, del.	15.76
Indianapolis, ovens ...	18.50
Cincinnati, del.	18.95
Ironton, O., ovens	16.75
Erie, Pa., del.	19.45
Painesville, O., ovens..	18.10
Cleveland, del.	19.60
Buffalo, del.	20.15
Detroit, del.	19.00
Philadelphia, ovens ...	17.75
Swedeland, Pa., ovens.	17.75
Portsmouth, O., ovens.	17.00

Coal Chemicals

Spot, cents per gallon

Pure and 90% benzol	21.00†
Toluol, two degrees	28.00
Industrial xylol	28.00
Solvent naphtha	28.00

Per pound fob works

Phenol (car lots, returnable drums)	12.50
Do., less than carlots.....	13.25
Do., tank cars	11.50

Eastern plants, per pound

Naphthalene flakes, balls, bbl. to jobbers, "household use"	11.00

Per ton, bulk, fob plants

Sulphate of ammonia.....	$40.00

† Freight allowed up to 2 cents.

Refractories

Net Prices

Per 1000, fob shipping point

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$92.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	73.00
Ala., Ga.	73.00
N. J.	78.00

Intermediate Heat Duty

Ohio	67.00
Pa., Ill., Md., Mo., Ky.	67.00
Ala., Ga.	59.00
N. J.	70.00

Low-Heat Duty

Pa., Md., Ohio	59.00

Ladle Brick

(Pa., O., Va., Mo.)

Dry Press	50.00
Wire Cut	48.00

Malleable Bung Brick

All bases	83.00

Silica Brick

Pennsylvania	73.00
Joliet, E. Chicago.....	82.00
Birmingham, Ala.	73.00

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	64.00
Chem. bonded chrome.....	64.00
Magnesite brick	86.00
Chem. bonded magnesite....	75.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	27.00
Single bags	31.50

Dolomite

Domestic, dead-burned, bulk, net tons, fob Billmeyer, Blue Bell or Williams, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg or Woodville, O., $11.05; Midwest (fob Thornton or McCook, Ill.), add $0.10; Missouri Valley (fob Dolly Siding, and Bonne Terre, Mo.), add $0.20.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$6.60
Old range nonbessemer	6.45
Mesabi bessemer	6.35
Mesabi nonbessemer	6.20
High phosphorus	6.20

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.62% contract	15.25

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos....	Nom.
Swedish basic, 60 to 68%	13.50-14.00
Spanish, No. African basic, 50 to 60%.....	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50-6.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$26-$28

Manganese Ore

48-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 65.00-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio.....	31.00
South African (Transvaal)	
44% no ratio.....$25.50-	$26.00
45% no ratio.....	26.50
48% no ratio.....	28.50
50% no ratio.....	29.50
Brazilian—nominal	
44% to 2.5:1 lump.....	$33.65
Rhodesian	
45% no ratio.....$27-	$27.50
48% no ratio.....	30.00
48% 3:1 lump.....	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo., cont., Mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $35; less than 60% $32.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheet, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	...	...	...
Cold-Rolled	5.30	5.30	5.30	5.30	...	5.30	...	...	...
Galvanized	6.00	...	...	...	...	6.00	...	...	...
Strip, Hot-Rolled	4.30	4.30	4.30	4.30	...	...	...	...	...
Cold-Rolled	5.30	5.30†	5.30†	5.30	...	...	...	...	...
Shapes, Structural	4.30	4.30	...	4.30	...	...	4.30	...	...
Plates	4.55	4.55	4.55	...	4.55	...	...	...	...
Bars, Small Shapes	4.45	4.45	4.45	4.45	...	4.45	...	4.45	4.45

† Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher.

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	†C-R	H-R Rds. ⅝" to 3"	C-F Rds. ½"& up	H-R Alloy (**4140)	Structural Shapes	Carbon ⅝"-¾"	Floor ¾" & Thicker
Boston (city)	5.03	6.09[4]	5.79[4]	6.23[4]	7.58[4]	5.61	6.87	5.04	5.88	7.64	4.91	5.18	6.26
New York (city)	4.96	6.16	5.86	6.16	7.51	5.59	...	5.06	5.63	7.23	4.80	5.11	6.73
New York (country)	4.81	6.01	5.71	6.01	7.36	5.44	...	4.91	...	...	4.65	4.96	6.63
Philadelphia (city)	4.70	6.32	5.92	5.90	7.25	5.32	5.72	4.87	5.75	8.77	4.57	4.85	6.47
Philadelphia (country)	4.55	6.18	5.78	5.75	7.10	5.17	5.57	4.73	...	...	4.47	4.71	6.32
Baltimore (city)	4.32†	5.95	5.65	5.72	7.07	4.80	...	4.85	5.71	...	4.71	4.77	6.30
Baltimore (country)	4.17†	5.80	5.50	5.50	6.85	4.65	...	4.70	...	...	4.56	4.62	6.15
Washington (city)	4.81	...	...	...	...	5.08	...	5.14	5.79[12]	...	4.98	5.03	6.60
Washington (country)	4.71	...	...	...	...	4.98	...	5.04	...	...	4.85	4.93	6.50
Norfolk, Va.	4.90	...	...	...	...	...	...	5.20	6.00	...	5.15	5.15	6.90
Memphis, Tenn. (city)	4.82[20]§§	5.87[20]†	...	6.37	...	5.02[20]	...	4.97[20]	5.87	...	4.97[20]	5.17[20]	6.87[20]
Memphis, Tenn. (country)	4.72[20]§§	5.77[20]†	...	6.27	...	4.92[20]	...	4.87[20]	5.77	...	4.87[20]	5.07[20]	6.77[20]
Buffalo (city)	4.45	...	5.20[5]	6.05	...	5.25	5.65	4.40	5.10	6.85	4.40	5.00	6.25
Buffalo (country)	4.30	...	5.05[5]	5.50	...	4.70	5.50	4.25	4.95	6.85	4.25	4.45	5.75
Pittsburgh (city)	4.25§§	...	5.10[8]†	5.65	6.90	4.35	5.35	4.40	5.10	6.85	4.40	4.60	5.90
Pittsburgh (country)	4.10§§	...	4.95[8]†	5.50	6.75	4.20	5.20	4.25	4.95	6.85	4.25	4.45	5.75
Cleveland (city)	4.45	5.50[8]	5.20[8]	5.82	7.17	4.55	5.35	4.40	5.10	7.26	4.70	4.60	6.05
Cleveland (country)	4.30	5.35[8]	5.05[8]	...	...	...	5.20	4.25	4.95	...	...	4.45	5.90
Cincinnati	4.56	...	5.22	5.77	...	4.77	...	4.78	5.63	...	4.82	4.98	6.47
Detroit	4.55	...	5.30	...	...	4.72	5.63	4.50	5.22	7.10	4.77	4.88	6.28
Indianapolis	4.55	5.32[8]	...	5.87	7.12	4.65	5.90	4.70‡‡	5.40	8.85	4.70	4.90	6.35
Chicago (city)	4.45	5.50[8]	5.20[8]	5.65	6.90	4.35	5.45	4.40	5.10	6.85[9]	4.40	4.60	6.08
Chicago (country)	4.30	5.35[8]	5.05[8]	5.50	6.75	4.20	5.30	4.25	4.95	6.85[9]	4.25	4.45	5.90
Milwaukee	4.658	5.708[8]	5.408[8]	5.858	7.108	4.558	5.658	4.608	5.308	7.208[9]	4.608	4.808	6.258
St. Louis	4.78	5.83[8]	5.53[8]	6.02	7.27	4.68	5.82	4.73	5.47[13]	...	4.73	4.93	6.38
Birmingham (city)	4.45[20]§§	...	...	5.65	...	4.45[20]	...	4.40[20]	5.93[22]	...	4.40	4.65	6.86
Birmingham (country)	4.30[20]§§	...	...	5.50	...	4.30[20]	...	4.25[20]	...	...	4.25	4.50	...
New Orleans	4.98[20]**	...	6.29[15]	...	...	5.18[20]	...	5.13[20]††	6.29[11]	...	5.03[20]††	5.33[20]	7.29[20]
Omaha, Nebr.	5.462	...	...	6.712	8.012	5.362	...	5.412	6.112	7.562	5.412	5.612	7.062
Houston, Tex.	5.75	...	...	7.36	8.10	6.00	...	5.35	7.00[13]	...	5.85	5.85	6.50
Los Angeles (city)	5.75	7.75[8]	7.45[8]	7.40	8.80	6.05	8.70	5.50	7.35[22]	9.35[16]	5.35	5.55	7.65
Los Angeles (country)	5.60	7.60[8]	7.30[8]	7.25	8.65	5.90	8.55	5.35	7.20[1]	9.20[16]	5.20	5.40	7.50
San Francisco	5.40[21]	6.65[8]	...	7.05[8]	7.95[8]	5.75[21]	8.70[18]	5.05[21]	7.00[13]	...	5.30[21]	5.50[21]	7.10[21]
Seattle, Tacoma, Wash.	5.30[17]§§	...	7.10[8]‡	6.95	...	5.60[17]	...	5.45[17]	7.45[19]	8.50[12]	5.25[17]	5.55[17]	7.65[19]
Portland, Oreg.	5.30[17]§§	...	7.10[8]‡	6.70	...	5.60[17]	...	5.45[17]	7.45[19]	...	5.25[17]	5.45[17]	7.55[19]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [16]—2000 lb and over; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier.

PRICES OF LEADING FERROALLOYS PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $52, Palmerton, Pa., $51, Pittsburgh, 16% to 19% Mn., $51, Palmerton, $50, Pittsburgh.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.). Carload, lump, bulk $145 per gross ton of alloy, carload packed $157, ton lot $172, less ton $189; fob New Orleans, Mobile, Philadelphia, Baltimore, or New York. Carload, lump, bulk $151, fob cars Pittsburgh, including 50c switching charge. Add, or subtract, $1.80 for each 1%, or fraction thereof, of contained manganese over 82% or under 78%. **West Coast Prices:** Carload (80,000 lb or more), lump, bulk, same price and basing points as above. All other prices for shipment from Pacific Coast warehouses, add $26.21 to above prices. Delivery is fob Portland, Los Angeles, South San Francisco, or Seattle warehouses, with railroad freight allowed on shipments of 25 gross tons or more.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Eastern Zone, carload, lump, bulk, max. 0.10% C, 22.5c per lb of contained Mn, carload packed 23.25c, ton lot 24.35c, less ton 25.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade: (Mn 90% approx., C 0.07% max., P 0.06% max.).** Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Eastern Zone, carload, lump, bulk 16.5c per lb of contained Mn, carload packed 17.25c, ton lot 18.35c, less ton 19.55c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Eastern Zone, carload, 2" x D, bulk 32c per lb of metal, carload packed 32.5c, ton lot 34c, less ton 36c; Central, add 1c for c.l. and 1.45c for l.c.l.; Western, add 1.45c for c.l. and 2.4c for l.c.l. Freight allowed. Spot, add 2c.

Silicomanganese: (Mn 65-70%). Eastern Zone, contract, lump, bulk, 1.50% C grade, 17-20% Si, 7.8c per lb of alloy, carload packed, 8.55c, ton lot 9.45c, less ton 10.45; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5 for l.c.l. Freight allowed. For 2.0% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Eastern Zone, contract, c.l., lump, bulk 18.6c per lb of contained Cr, c.l., packed 19.5c, ton lot 20.65c, less ton 22.05c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Eastern Zone, contract, c.l.,8MxD, bulk 20.1c per lb of contained Cr, c.l., packed 21.0c, ton lot 22.35c, less ton 24.1c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Eastern Zone, contract, carload, lump, bulk, max. 0.03% C 28.5c per lb of contained Cr, 0.04% C 27.5c, 0.05% C 27.0c, 0.06% C 26.5c, 0.10% C 26.0c, 0.15% C25.5c, 0.20% C 25.25c, 0.50% C 25.0c, 1% C 24.5c, 2% C 24.25c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, add C 1.25% max.). Eastern Zone, contract, carload, lump, bulk 25c per lb of contained chromium, carload, packed 26.1c, ton lot 27.3c, less ton 29.1c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 2c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 2c for each 0.25% of N above 0.75%.

Chromium Metal: (Mn. 97% Cr and 1% Fe). Eastern Zone, contract, carload, 1" x D, packed, max. 0.50% C grade, 93c per lb of contained chromium, ton lot 94.5c, less ton 97c; Central, add 1.5c for c.l. and 2.5c for l.c.l.; Western, add 2.75c for c.l. and 4.5c for l.c.l. Freight alowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 9.3c per lb of contained Si. carload packed 10.9, ton lot 12.35c, less ton 14.0c; Central, add 0.5c for c.l. and 1.25c for l.c.l.; Western, add 0.7c for c.l. and 1.8c for l.c.l. Freight allowed. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 11.8c per lb of contained Si carload packed 13.1c, ton lot 14.25c, less ton 15.5c; Central, add 0.3c for c.l. add 0.75c for l.c.l.; Western, add 1.05c for c.l. and 3c for l.c.l. Freight allowed. Spot, add 0.3c.

85% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 13.3c per lb of contained, Si carload packed 14.55c, ton lot 15.55c, less ton 16.7c; Central, add 0.3c for c.l. and 0.7c for l.c.l.; Western, add 1.05c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk, 15c per lb of contained Si carload packed 16.2c, ton lot 17.15c, less ton 18.2c; Central, add 0.3c for c.l. and 0.65c for l.c.l.; Western, add 1c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Over 97% Si and 1% max. Fe). Eastern Zone, c.l., lump, bulk, regular 17.3c per lb of Si, c.l. packed 18.5c, ton lot 19.4c, less ton 20.4c; Central, add 0.6c for c.l. and 2.25c for l.c.l.; Western, add 1.2c for c.l. and 4c for l.c.l. Add 1c for max. 0.20% calcium grade. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing over 96% Si. Spot, add 0.25c.

Alsifer: (Aprox. 20% Al, 40% Si, 40% Fe) Contract basis fob Niagara Falls, N. Y., lump per lb c.l. 6.90c; ton lots packed, 7.40c; 200 to 1999 lb, 8.15c; smaller lots, 8.65c. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Eastern Zone, contract, carload, bulk, 12.5c per lb or briquet, carload packed 13.2c ton lot 14.0c, less ton 14.9c; Central, add 0.25c for c.l. and 0.9c for l.c.l.; Western, add 0.35c for c.l. and 1.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Eastern Zone, contract, carload, bulk, 8.7c per lb of briquet, c.l. packaged 9.5c, ton lot 10.3c, less ton 11.2c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Eastern Zone, contract, c.l. bulk 8.75c per lb of briquet, c.l. packed 9.55c, ton lot 10.35c, less ton 11.25c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Eastern Zone, contract, carload, bulk 5.1c per lb of briquet, c.l. packed 5.25c, ton lot 6.7c, less ton 7.6c. **(Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Eastern Zone, carload, bulk 5.25c, c.l. packed 6.05c, ton lot 6.85c, less ton 7.75c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.45c for c.l. and 0.9c for l.c.l. Freight allowed. Add 0.25c for notching, small size only. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Eastern Zone, contract, carload, lump, bulk 17.50c per lb of alloy, carload packed 19.0c, ton lot 19.8c, less ton 20.8c; Central, add 0.5c for c.l. and 0.85c for l.c.l.; Western, add 2.55c for c.l. and 2.6c for l.c.l. Freight allowed. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Eastern Zone, contract, carload, lump, bulk 16.25c per lb of alloy, carload packed 16.45c, ton lot 19.35c, less ton 20.85c; Central, add 0.5c for c.l. and 0.75c for l.c.l.; Western, add 2.55c for c.l. and 2.90c for l.c.l. Freight allowed. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 50-55%, Si 8% max., C 3% max.). Eastern Zone, contract, any quantity, $2.90 per lb of contained Va; Central, add 2c for c.l. and 3c for l.c.l.; Western, add 6c for c.l. and 9c for l.c.l. Freight allowed. Spot, add 10c. **Special Grade** (Va 50-55%, Si 4% max., C 1% max.), $3. **High Speed Grade** (Va 50-55%, Si 1.50% max., C .29% max.). $3.10.

Vanadium Oxide: All Zones, contract, less carload lots, $1.20 per lb of contained V_2O_5. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

TITANIUM ALLOYS

Ferrotitanium: (Ti 20-25%, Al 3% max., Si 4% max., C 0.10% max.). Eastern Zone, contract, ton lot, 2" x D, $1.35 per lb of contained Ti, less ton $1.40. (Ti 40-45%, Al 7% max., Si 4% max., C 0.10% max.). Ton lot $1.23, less ton $1.25; Central, add 4c for 20-25% Ti grade, and 2.1c for 40-45% grade; Western, add 13.5c for 20-25% Ti grade, and 7.2c for 40-45% grade. Freight allowed. Spot, add 5c.

Ferrotitanium, High-Carbon: (15-20%). Contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Eastern Zone, contract, 10,000 lb W or more, $2.25 per lb of contained W; 200 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Eastern Zone, contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Eastern Zone, contract, c.l., lump, bulk 6c per lb of alloy, c.l. packed 6.75c, ton lot 7.5c, less ton 8.35c; Central, add 0.25c for c.l. and 1.1c for l.c.l.; Western, add 0.6c for c.l. and 3.95c for l.c.l. Freight allowed. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Eastern Zone, contract, carload, lump, packed 18.4c per lb of alloy, ton lot 19.15c, less ton 20.40c; Central, add 0.6c for c.l. and 1.05c for l.c.l.; Western add 3.05c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Eastern Zone, contract, 100 lb or more, 1" x D, $1.20 per lb of alloy, freight allowed. Less than 100 lb $1.30; Central, add 0.75c; Western add 2.9c, freight allowed. Spot, add 5c.

Borosil: (3 to 4% B, 40 to 45% Si). $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Eastern Zone, contract, ton lot, 2" x D, $2.50 per lb of contained Cb, less ton $2.55; Central, add 1.65c; Western, add 6.45c. Freight allowed. Spot, add 10c.

CMSZ Mixes: No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Eastern Zone, carload, 12 M x D, carload packed 17.25c per lb of material, ton lot 18.00c, less ton 19.25c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Eastern Zone, carload, packed, 1" x D, 39c per lb of alloy, ton lot 41c, less ton 43c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Eastern Zone, contract, carload, packed, ½" x 12 M, 15.0c per lb of alloy, ton lot 15.75c, less ton 17.0c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed. Spot, add 0.25c.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 10c, ton lots 10.25c, smaller lots 10.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus: 17-19% based on 18% P content with unitage of $3 for each 1% of P above or below the base) Gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferromolybdenum: (55-75%). Per lb, contained Mo. fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Platinum Price Rise Features Metal Markets

$14 per ounce advance posted. Defense program will aggravate present shortage of metals

NEW YORK — Step-up in production of airplanes and other defense items under the government's preparedness program, which is developing, will be reflected almost immediately in nonferrous metal markets, especially aluminum. Supplies of all major metals have tightened steadily since the beginning of the year and would become acutely short if substantial tonnages should be diverted from civilian to defense industries. Price changes announced last week included advances of $14 an ounce on platinum and $10 an ounce on iridium.

COPPER — Bureau of Mines estimates domestic supply of new copper in the United States at 1,325,000 tons, including 450,000 tons of imported metal, compared with estimated consumption of 1,175,000 tons, and exports of 150,000 tons. The Bureau expects that domestic industrial requirements will again exceed supplies and that actual consumption will be dictated by the quantity of copper available for use.

Opening of books for April delivery found consumers as anxious as ever to enter their orders. Prices held on the basis of 21.50c, delivered Connecticut Valley, for electrolytic.

BRASS AND BRONZE INGOTS— Shipments of brass and bronze ingots declined to 22,487 tons in February from 26,998 tons in January and compared with 24,686 tons for the like month a year ago. Shipments increased sharply, however, during March.

LEAD — National Lead Co. advanced prices 1 cent a pound, effective Apr. 1, on dry white lead to the basis of 17.50c a pound for 500 pounds to 20 tons and 16.50c a pound in 20-ton carlots. The company also announced increases of $3 a ton in its prices for lead oxides, effective Apr. 5, to the following levels for less than carlots: 17.75c for litharge; 18.75c for dry red lead; and 21.10c for orange mineral. The advances were in line with those taken by other leading manufacturers effective as of Mar. 20.

Settlements have been reached at the San Luis Potosi lead smelter, Mexico, and at the Santa Eulalis lead mine of the American Smelting & Refining Co. This company's Chihuahua lead smelter had remained open throughout the labor difficulties while its Monterrey refinery resumed operations about Mar. 25 after having been closed since Mar. 1. The important Mexican silver-lead-zinc-copper mines of the Fresnillo Co. are again operating. Still closed by strikes are the American Smelting's Santa Barbara, Charcas and Parral lead mines and properties of the San Francisco Co.

ZINC — Demand for zinc continues to exceed supply, forcing sellers to allocate their offerings carefully. Domestic mine production of recoverable zinc in January was 7 per cent under the average monthly rate for 1947, 14 per cent below the average for the first six months of 1947, and virtually unchanged from the average during the last half of the year, according to the Bureau of Mines. Compared with January, 1947, production was 12 per cent lower.

American Zinc, Lead & Smelting Co. has advanced its price for lead-free French process zinc oxide 1 cent a pound to the basis of 11.00c a pound for carload lots, while the 35 per cent lead grade advanced 7/8-cent to 12.62-1/2c a pound.

TIN — British Ministry of Supply has advanced Malayan tin prices, effective Apr. 7, as follows: Buying prices to £504 per ton from £500; selling prices to £505 10s from £504, both ex smelter Penang or Singapore. Increase in the selling price is equivalent to only 27 cents per 100 pounds and is not sufficient to disturb the RFC's selling price of 94.00c, according to trade authorities.

NONFERROUS METAL PRICES

Copper: Electrolytic, carloads 21.50c, delivered Conn.; Lake, 21.62½c del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c 1000-4999 lb; 1½c, 500-999 lb; 2c 0-499 lb. Casting, nom., refinery, 20,000 lb or more; nom., less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 19.00-19.25c; 88-10-2 (No. 215) 28.00c; 80-10-10 (No. 305) 24.25c; No. 1 yellow (No. 405) 15.00-16.00c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than carloads.

Zinc: Prime western 12.00c, brass special 12.25c, intermediate 12.50c, E. St. Louis; high grade 13.00c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 16.50-16.75; No. 12 foundry alloy (No. 2 grade) 16.25-16.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 16.50-17.00c; grade 2 (92-95%) 16.00-16.50c; grade 3 (90-92%) 15.75-16.00c; grade 4 (85-90%) 15.25-15.50c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, about 20 lb), 10,000 lb and over, 20.50c, fob Freeport, Tex.; 2000 to 9999 lb, 21.50c; 100 to 1999 lb, 22.50c. Extruded rounds, 12 inches long, 1.312 inches in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb. 42.00-46.00c; 100 to 4000 lb, 35.00-36.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (including Straits), 94.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 93.85c; Grade C, 99.65-99.79% incl. 93.50c; 99.00-99.64% 93.50c and 98.00-98.99%, 92.60c for tin content.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 224-999 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 33.75c lb; 25 lb pigs produced from electrolytic cathodes 35.25c lb; shot produced from electrolytic cathodes 36.25c lb; "F" nickel shots or ingots for addition to cast iron 34.25c lb. Prices include import duty.

Mercury: Open market, spot, New York, $76-$78 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $20.50 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 lb for 550 lb (keg) $1.67 lb for 100 lb (case); $1.72 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y., 74.62½c, per ounce.

Platinum: $86-$89 per ounce.

Palladium: $24 per troy ounce.

Iridium: $105-$115 per troy ounce.

Rolled, Drawn, Extruded Products

Copper and brass product prices are fob mill, with freight prepaid on 200 lb or more.

Sheet: Copper 33.68c; yellow brass 30.16c; commercial bronze, 95% 33.80c, 90% 33.27c; red brass, 85% 32.23c, 80% 31.70c; best quality 31.09c; Everdur, Duronze, Herculoy or equiv., hot-rolled, 38.56c; nickel silver, 18%, 42.42c; phosphor bronze, grade A, 5%, 52.70c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.69c; commercial bronze, 95% 33.49c, 90% 32.96c; red brass, 85% 31.92c, 80% 31.39c; best quality 30.78c.

Seamless Tubing: Copper 33.72c; yellow brass 32.92c; commercial bronze 90% 35.68c; red brass 85% 34.89c, 80% 34.36c; best quality brass 33.50c.

Wire: Yellow brass 30.45c; commercial bronze, 95% 34.09c, 90% 33.56c; red brass, 85% 32.52c, 80% 31.99c; best quality brass 31.38c.

Copper Wire: Bare, soft, fob eastern mills, carlots 26.80c, less carlots 27.30c; weatherproof, fob eastern mills, carlots 27.35c, less carlots 27.85c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88.

Aluminum Sheets and Circles: 2s and 3s mill finish; base price, cents per pound, 30,000 lb or more, bulk or skid packing, fob shipping point. Transportation allowance: Actual transportation charges not exceeding the rail freight rate applicable to shipments of 30,000 lb are deducted on shipments of 500 lb or more.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	24.0	...	...
0.135-0.126	12-48	24.5	...	...
0.125-0.096	12-48	24.5	23.1	26.3
0.095-0.077	12-48	25.0	23.2	26.5
0.076-0.061	12-48	25.5	23.4	26.7
0.060-0.048	12-48	25.7	23.6	27.0
0.047-0.038	12-48	26.1	23.8	27.3
0.037-0.030	12-48	26.4	24.1	27.7
0.029-0.024	12-48	26.8	24.4	28.1
0.023-0.019	12-36	27.4	24.8	28.6
0.018-0.017	12-36	27.9	25.3	29.3
0.016-0.015	12-36	28.6	25.9	30.1
0.014	12-24	29.4	26.6	31.1
0.013-0.012	12-24	30.2	27.3	32.0
0.011	12-24	31.1	28.1	33.1
0.010-0.0095	12-24	32.1	29.0	34.3
0.009-0.0085	12-20	33.2	30.0	35.7
0.008-0.0075	12-20	34.4	31.1	37.1
0.007	12-18	35.7	32.3	38.8
0.006	12-18	37.0	33.5	42.6

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Lead Products: Prices to jobbers, fob Cleveland, Pittsburgh: Sheets, full rolls, 140 sq ft or more, 18.35c per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft; $1.25, less than 10 sq ft; $1, circles and segments.
Pipe: Full coils, 17.60c per cwt; cut coils, 17.85c.
Lead Traps and Bends: List price plus 42%.

Zinc Products: Sheet, 16.50c-17.00c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 15.25c-16.00c, fob mill, 36,000 lb and over. Plates, not over 12-in., 14.25c; over 12-in., 15.25c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 22.00c; 5 tons and over 22.50c; 1 to 5 tons, 23.00c; less than 1 ton, 23.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Carbonate: 52-54% metallic Cu; 50 lb bags, 25.00c fob Cleveland.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c, 3000 to 10,000 lb, 50.00c; 500 to 3000 lb. 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 23.50c; 275-lb, or 500 bbls. 21.50c, fob Cleveland.

Tin Anodes: Bar, 1000 lb and over 110.00c; 500 to 1000 lb, 110.50c; 200 to 5000 lb, 111.00c; less than 200 lb, 112.50c; ball, 1000 lb and over, 112.25c; 500 to 1000 lb. 112.75c; 200 to 500 lb, 113.25c; less than 200 lb, 114.75c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., price on application.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers and resellers, 67.4c; 100 or 300 lb drums only, 100 to 500 lb, to consumers 59.2c, to resellers 54.8c; 600 to 1900 lb, to consumers 56.8c, to resellers 52.5c; 2000 to 9900 lb, to consumers 55.0c, to resellers 50.9c; 10,000 lb or more l.c.l., to consumers 53.9c, to resellers 49.9c; carloads, to consumers 52.7c, to resellers 48.7c. Prices fob Sewaren, N. J.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland or Detroit; 35.00, fob Philadelphia.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)
Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.625	15.375	14.750
Commercial Bronze			
95%	18.125	17.875	17.375
90%	17.625	17.375	16.875
Red brass			
85%	17.500	17.250	16.750
80%	17.250	17.000	16.500
Best Quality (71-79%)	16.625	16.375	15.875
Muntz Metal	14.750	14.500	14.000
Nickel silver, 5%	16.500	16.250	8.250
Phos. bronze, A. B.	20.750	20.500	19.500
Naval brass	15.250	15.000	14.500
Manganese bronze	15.250	15.000	14.375

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.50-17.75, No. 2 copper 16.50-16.75, light copper 15.50-15.75, composition red brass 14.75, auto radiators 11.50, heavy yellow brass 10.75, brass pipe 11.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.50, No. 2 copper 17.50, light copper, 16.50, refinery brass (60% copper), per dry copper content 16.00.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.25-16.75, No. 2 15.50-16.00, light copper 14.25-14.75, No. 1 composition red brass 12.50-13.00, No. 1 composition turnings 12.00-12.50, mixed brass turnings 7.50-7.75, new brass clippings 12.50-13.00, No. 1 brass rod turnings 10.00-10.50, light brass 6.50-7.00, heavy yellow brass 8.75-9.00, new brass rod ends 10.50-11.00, auto radiators, unsweated 9.75-10.25, cocks and faucets 9.75-10.25, brass pipe 9.75-10.25.

Lead: Heavy 13.50-14.00, battery plates 7.50-7.75, linotype and stereotype 14.50-15.00, electrotype 12.00-12.50, mixed babbitt 13.50-14.00, solder joints 16.50-17.00.

Zinc: Old zinc 5.50-5.75; new die cast scrap 4.75-5.25, old die cast scrap 2.75-3.25.

Tin: No. 1 pewter 60.00-62.00, block tin pipe 77.00-78.00, auto babbitt 45.00-47.00, No. 1 babbitt 45.00-48.00, siphon tops 45.00-47.00.

Aluminum: Clippings 2S 9.00-9.50, old sheets 7.00-7.50, crankcases 7.00-7.50, borings and turnings 2.50-3.00, pistons, free of struts, 6.00-6.50.

Nickel: Anodes 16.00-17.00, turnings 12.50-13.00, rod ends 16.00-17.00.

Monel: Clippings 12.00-12.50, turnings 7.00-7.25, old sheets 10.00-10.50, rods 10.00-10.50, castings 9.00.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
March Average:	21.500	14.825	12.000	94.000	15.000	33.000	33.750	74.625
Mar. 1-31	21.500	14.80–14.85	12.000	94.000	15.000	33.000	33.750	74.625
Apr. 1	21.500	14.80–14.85	12.000	94.000	15.000	33.000	33.750	74.625

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, fob Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$40.00-40.50*
No. 2 Heavy Melt. Steel	40.00-40.50*
No. 1 Busheling	40.00-40.50*
Nos. 1, 2 & 3 Bundles	40.00-40.50*
Machine Shop Turnings	35.50-36.00
Mixed Borings, Turnings	35.50-36.00
Short Shovel Turnings.	36.00-37.00
Cast Iron Borings	36.00-37.00
Bar Crops and Plate	47.50-48.00
Low Phos. Steel	47.50-48.00
Heavy Turnings	40.00-40.50

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Charging Box Cast	48.00-49.00
Heavy Breakable Cast.	48.00-49.00
Unstripped Motor Blocks	**52.00-53.00**
Malleable	**69.00-70.00**
Brake Shoe	**52.00-53.00**
Clean Auto Cast	**58.00-59.00**

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.00-41.50
R.R. Malleable	75.00-80.00
Axles	51.50-52.00
Rails, Rerolling	56.00-57.00
Rails, Random Lengths	58.00-59.00
Rails, 3 ft and under	60.50-61.00
Rails, 18 in. and under	61.50-62.00
Railroad Specialties	54.00-55.00
Uncut Tires	52.00-52.50
Angles, Splice Bars	53.00-54.00

*Plus applicable freight spring-board.

CLEVELAND

No. 1 Heavy Melt. Steel	$39.50-40.00*
No. 2 Heavy Melt. Steel	39.50-40.00*
No. 1 Busheling	39.50-40.00*
Nos. 1 & 2 Bundles	39.50-40.00*
Machine Shop Turnings	34.50-35.00
Mixed Borings, Turnings	34.00-36.00
Short Shovel Turnings.	35.50-36.00
Cast Iron Borings	35.50-36.00
Bar Crops and Plate	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Heavy Turnings	39.50-40.50
Alloy Free Turnings	37.50-38.50
Cut Structurals	46.00-49.00

*Plus applicable freight spring-board.

Cast Iron Grades

No. 1 Cupola	68.00-70.00
Charging Box Cast	58.00-60.00
Stove Plate	58.00-60.00
Heavy Breakable Cast.	54.00-56.00
Unstripped Motor Blocks	58.00-60.00
Malleable	73.00-78.00
Brake Shoes	52.00-53.00
Clean Auto Cast	68.00-70.00
No. 1 Wheels	58.00-60.00
Burnt Cast	56.00-57.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.50*
R.R. Malleable	73.00-78.00
Rails, Rerolling	57.00-58.00
Rails, Random Lengths	56.00-57.00
Rails, 3 ft and under	61.00-63.00
Cast Steel	56.00-58.00
Railroad Specialties	53.00-55.00
Uncut Tires	56.00-57.00
Angles, Splice Bars	57.00-59.00

*Plus applicable freight spring board.

VALLEY

No. 1 Heavy Melt. Steel	40.00-40.50*
No. 2 Heavy Melt. Steel	40.00-40.50*
No. 1 Bundles	40.00-40.50*
Machine Shop Turnings	34.50-35.50
Short Shovel Turnings.	36.50-37.00
Cast Iron Borings	36.00-36.50
Low Phos.	46.00-47.50

* Plus applicable freight spring-board.

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50-41.50*

*Plus applicable freight spring board.

MANSFIELD

Machine Shop Turnings	$35.00-35.50
Short Shovel Turnings.	37.00-37.50

CINCINNATI

No. 1 Heavy Melt. Steel	$39.50
No. 2 Heavy Melt. Steel	39.50
No. 1 Busheling	39.50
Nos. 1 & 2 Bundles	39.50
Machine Shop Turnings	33.50
Mixed Borings, Turnings	32.50
Short Shovel Turnings.	35.50
Cast Iron Borings	34.50

Cast Iron Grades

No. 1 Cupola Cast	55.00
Charging Box Cast	43.00
Heavy Breakable Cast.	50.00
Stove Plate	47.00
Unstripped Motor Blocks	45.00
Brake Shoes	45.00
Clean Auto Cast	55.00
Drop Broken Cast	60.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	40.50
R.R. Malleable	68.00
Rails, Rerolling	53.00
Rails, Random Lengths	50.00
Rails, 18 in. and under	60.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$35.00-35.50
No. 1 Busheling	35.00-35.50
Nos. 1 & 2 Bundles	35.00-35.50
No. 3 Bundles	35.00-35.50
Machine Shop Turnings	29.00-29.50
Mixed Borings Turnings	29.00-29.50
Short Shovel Turnings.	30.00-30.50
Cast Iron Borings	30.00-30.50
Punchings & Plate Scrap	40.00-40.50

Cast Iron Grades

No. 1 Cupola Cast	60.00-62.00
Heavy Breakable Cast.	50.00-52.00
Clean Auto Cast	62.00-65.00

BUFFALO

No. 1 Heavy Melt. Steel	$42.00-44.00
No. 2 Heavy Melt. Steel	39.75-40.25
No. 1 Busheling	39.75-40.25
No. 1 & 2 Bundles	39.75-40.25
Machine Shop Turnings	34.75-35.25
Mixed Borings, Turnings	34.75-35.25
Cast Iron Borings	35.75-36.26
Short Shovel Turnings.	36.75-37.25
Low Phos.	44.75-46.00

Cast Iron Grades

No. 1 Cupola	65.00-70.00
Mixed Cupola	62.00-65.00
Heavy Breakable Cast.	55.00-57.00
Malleable	70.00-75.00
Clean Auto Cast	62.00-64.00

Railroad Scrap

Rails, 3 ft. and under.	56.00-58.00
Railroad Specialties	52.00-53.00

PHILADELPHIA

No. 1 Hvy. Melt. Steel	$41.50
No. 2 Hvy. Melt. Steel	39.00
No. 1 Busheling	39.00
Nos. 1 & 2 Bundles	39.00
No. 3 Bundles	37.00
Machine Shop Turnings	34.00-35.00
Mixed Borings, Turnings	34.00-35.00
Short Shovel Turnings.	34.00-35.00
Bar Crop and Plate	44.50-45.50
Punchings & Plate Scrap	44.50-45.50
Cut Structurals	44.50-45.50
Elec. Furnace Bundles.	43.50-44.50
Heavy Turnings	42.50-43.00
No. 1 Chemical Borings	42.00-43.00

Cast Iron Grades

No. 1 Cupola Cast	64.00-65.00
No. 1 Machinery Cast.	66.00-67.00
Charging Box Cast	60.00-61.00
Heavy Breakable Cast.	60.00-61.00
Unstripped Motor Blocks	61.50-62.50
Malleable	74.00-76.00
Clean Auto Cast	64.00-65.00
No. 1 Wheels	67.00-68.00

NEW YORK

(Brokers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.03
No. 2 Heavy Melt. Steel	34.03
No. 1 Busheling	34.03
Nos. 1 & 2 Bundles	34.03
No. 3 Bundles	32.03
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings.	30.50-31.00
Punchings & Plate Scrap	39.00-40.00
Cut Structurals	39.00-40.00
Elec. Furnace Bundles.	39.00-40.00

Cast Iron Grades

No. 1 Cupola Cast	56.00-58.00
Charging Box Cast	54.00-55.00
Heavy Breakable	54.00-55.00
Unstripped Motor Blocks	52.00-54.00
Malleable	68.00-69.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.40-31.90
No. 2 Heavy Melt. Steel	31.40-31.90
No. 1 Bundles	31.40-31.90
No. 1 Busheling	31.40-31.90
Machine Shop Turnings	26.90
Mixed Borings, Turnings	26.90
Short Shovel Turnings.	28.90
Bar Crops and Plate	35.00-37.00
Punchings & Plate Scrap	35.00-37.00
Chemical Borings	34.00-35.00

Cast Iron Grades

No. 1 Cupola Cast	55.00-60.00
Heavy Breakable Cast.	53.00-55.00
Stove Plate	50.00-52.00
Unstripped Motor Blocks	40.00-41.00
Clean Auto Cast	48.00-50.00

CHICAGO

No. 1 Heavy Melt Steel	$38.50-39.50
No. 2 Heavy Melt. Steel	38.50-39.50
No. 1 Bundles	38.50-39.50
No. 2 Bundles	38.50-39.50
No. 3 Bundles	36.50-37.50
Machine Shop Turnings	33.50-34.50
Mixed Borings, Turnings	33.50-34.50
Short Shovel Turnings.	35.50-36.50
Cast Iron Borings	34.50-35.50
Bar Crops and Plate	46.00-47.00
Punchings	47.50-48.50
Elec. Furnace Bundles.	39.50-40.50
Heavy Turnings	38.00-39.00
Cut Structurals	43.50-44.50

Cast Iron Grades

No. 1 Cupola Cast	65.00-67.00
Clean Auto Cast	65.00-67.00
No. 1 Wheels	54.00-57.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	41.25-41.75
Malleable	70.00-71.00
Rails, Rerolling	49.00-50.00
Rails, Random Lengths	46.50-47.50
Rails, 3 ft and under.	55.00-56.00
Rails, 18 in. and under	57.00-58.00
Railroad Specialties	49.00-50.00
Angles, Splice Bars	50.00-51.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$39.50-40.50
No. 2 Heavy Melt. Steel	37.50-38.50
Machine Shop Turnings	32.50-33.50
Short Shovel Turnings.	34.50-35.50

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	65.00-67.00
Mixed Cast	60.00-62.00
Heavy Breakable Cast.	53.00-55.00
Brake Shoes	54.00-55.00
Clean Auto Cast	64.00-66.00
Burnt Cast	58.00-59.00

Railroad Scrap

R.R. Malleable	65.00-70.00
Rails, Rerolling	50.50-52.50
Rails, Random Lengths	49.50-51.50
Rails, 3 ft and under	53.00-55.00
Uncut Tires	46.00-47.00
Angles, Splice Bars	46.00-48.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$37.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	37.00
Nos. 1 & 2 Bundles	37.00
No. 3 Bundles	31.00
Long Turnings	24.50
Short Shovel Turnings.	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.50
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	51.00
Stove Plate	43.00
No. 1 Wheels	45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	38.00
R.R. Malleable	45.00
Axles, Steel	39.00
Rails, Rerolling	52.00
Rails, Random Length.	39.00
Rails, 3 ft and under	41.00
Angles and Splice Bars	41.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$25.00
No. 2 Heavy Melt. Steel	*25.00
No. 1 Busheling	*25.00
Nos. 1 & 2 Bundles	*25.00
No. 3 Bundles	*20.00
Machine Shop Turnings	*15.50
Bar Crops and Plate	25.00
Cast Steel	25.00
Alloy Free Turnings	15.50
Cut Structurals	25.00
Tin Can Bundles	20.00

Railroad Scrap

No. 1 Heavy Melting	26.00
Axles	32.00
Rails, Random Lengths	26.50
Uncut Tires	33.50

* Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$26.00
No. 2 Heavy Melt. Steel	26.00
No. 1 Busheling	26.00
Nos. 1 & 2 Bundles	22.00-23.00
No. 3 Bundles	22.00-23.00
Machine Shop Turnings	14.50-16.50
Mixed Borings, Turnings	14.50-16.50
Punchings & Plate Scrap	26.00-28.00
Cut Structurals	26.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	40.00
Charging Box Cast	25.00
Heavy Breakable Cast.	24.00
Stove Plate	25.50
Unstripped Motor Blocks	24.00
Malleable	30.00
Brake Shoes	30.00
Clean Auto Cast	30.00
No. 1 Wheels	26.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	30.00
Rails, Random Lengths	21.50
Angles and Splice Bars	23.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles	25.00
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles.	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

HAMILTON, ONT.

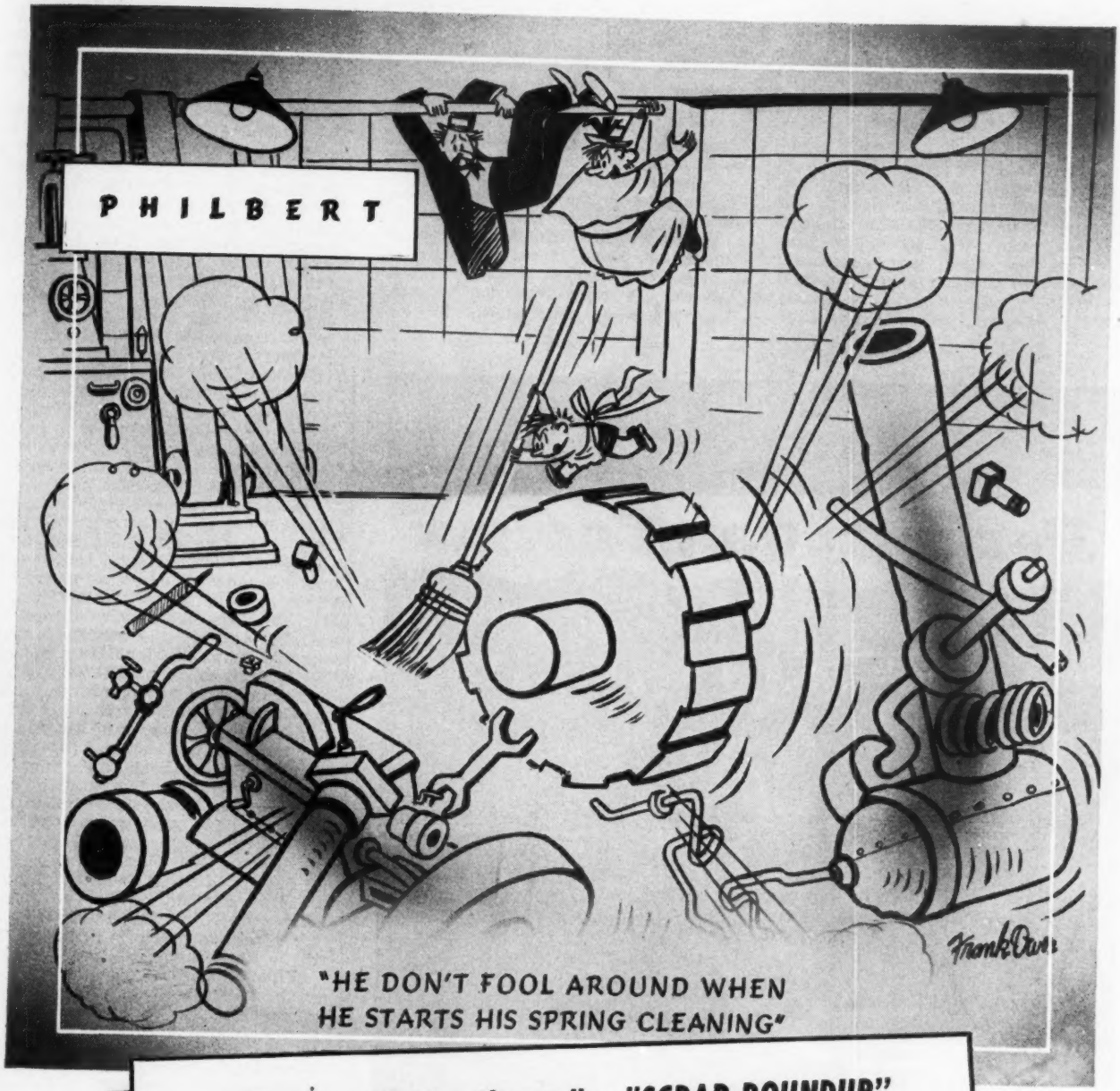
(Ceiling prices, delivered)

Heavy Melting	$22.00
No. 1 Bundles	22.00
Mechanical Bundles	20.00
Mixed Steel Scrap	19.00
Mixed Borings, Turnings	17.00
Rails, Remelting	28.00
Rails, Rerolling	26.00
Bushelings	17.00
Bushelings, new factory, prep'd	21.00
Bushelings, new factory, unprep'd	16.00
Short Steel Turnings	17.00

Cast Iron Grades*

No. 1 Cast	42.00-48.00
No. 2 Cast	35.00-37.00

* Removed from price control Aug. 9, 1947; quoted on basis of fob shipping point.



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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Sheets, Strip . . .

Producers may be forced to reduce second quarter quotas if coal strike continues

Sheet Prices, Page 138

New York—Should the coal strike continue much longer, sheet mill operations will be appreciably affected, thus adding further to the stringency in light flat-rolled products. So far sheet producers have not revised their second quarter quotas, but this may be necessary before the mine dispute is settled. At the moment, some units are off schedule slightly because of the coal stoppage, but not as much as in certain other lines of finished steel. Apparently, producers are making every effort to sustain output of sheets as long as possible.

Meanwhile, there is a growing interest in stainless sheets, with some mills having little to offer under three or three and a half months. Some of this interest is ascribed to airplane manufacturers, who anticipate a stepping up in their operations as a part of the proposed defense program. However, few of these interests, if any, have appreciably increased their purchases so far. As indicated recently, there has been some improvement in electrical sheets traceable in part to increased Signal Corps requirements.

Pittsburgh — One large producer here does not plan to make up sheet and strip tonnage lost in the first quarter until early in the third quarter. This interest has not altered customers' monthly allotments for second quarter, although they may be if coal mining operations are not resumed this week. No letup in pressure for prompt deliveries is in evidence. In a few instances, purchasing agents have become more cautious, but to date this change in buying policy has been limited to exorbitantly high priced steel obtained through ingot conversion. In only a few instances have consumers' inventory pipelines been filled, while many companies continue to report production schedules remain restricted to supply of flat-rolled steel. Unbalanced demand-supply situation is expected to become more pronounced for some major consumers over coming months, due primarily to probable adjustments in mill allotments to meet preferred domestic needs.

Boston — Rescheduling for second quarter appears likely with most narrow cold strip producers and indications are that hot strip tonnage will not balance tentative production. Some carbon round wire allocations for May have been revised downward; considerable of this material is used by cold strip mills for flattening. The stringency in raw material for cold reduction centers mainly in carbon grades with high carbon almost as tight as low. Supply of alloy is better balanced and demand is well sustained, notably with mills supplying the roller chain industry. Not much volume has been booked for third quarter and carryovers with most cold strip producers will be heavy for that period. Here and there users of flat-rolled failed to take full quotas in first quarter, as in the case of shank steel, but the overall pressure for sheets and strip is unabated with the demand far in excess of supply.

Philadelphia — Should the coal strike be settled promptly, sheet consumers may still receive more tonnage in the second quarter than they did in the first, when winter weather conditions adversely affected output. Demand is still well in excess of supply on all major sheet products and will probably continue so throughout the remainder of the year, regardless of what may develop in the way of defense requirements. However, were it not for probability of these requirements adding to the pressure, there should be some easing even in sheet supply before 1949.

Cleveland — Some sheet sellers believe that military preparedness talk may cause some steel consumers to attempt to build steel inventories, thus reversing the recent precautionary trend toward holding stocks to a minimum. Such efforts are expected to be unavailing, however, since overall demand is in excess of production, leaving little opportunity for a consumer to get more steel than he can currently use. Warehouse inquiries have been received by mills concerning availability of cold-rolled sheets and strip for aircraft usage, anticipating defense needs.

Capitol Corp., 1265 Broadway, New York, last week offered 6000 tons of 19-gage cold-rolled sheets, 36 in. by

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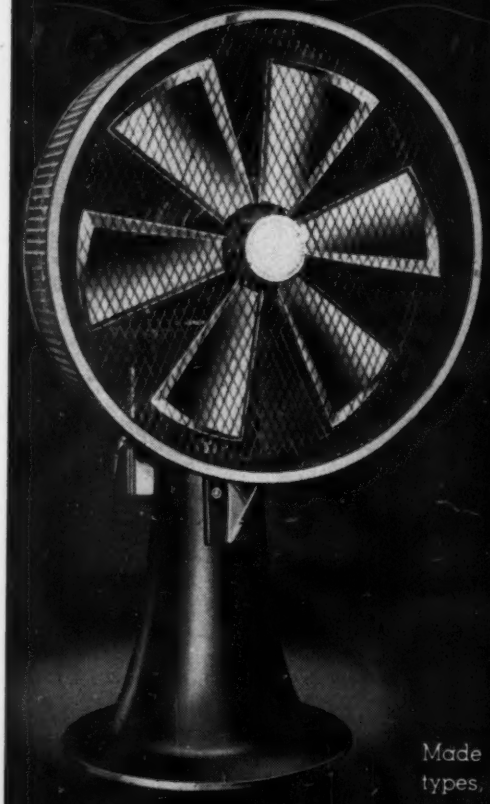

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120 in., of English manufacture. Priced at 12.00c a lb, fas New York, the sheets would be shipped at a rate of 500 tons a month.

Chicago—Consumers of flat-rolled products are pressing for shipments and indicate that quotas are not adequate to meet requirements. On the other hand, these consumers are not specifying against their third quarter quotas as promptly as they have done in the past. This raises the question as to whether they are merely lax or whether they display some uncertainty over the latter part of this year. There are some evidences that the latter may be the case, although companies which are currently scaling down production schedules and laying off workers explain their action as necessitated by lack of steel. Consumers are not quite as active in seeking conversion tonnage nor is the gray market commanding the high prices as previously.

Cincinnati—Sheet mills continued operations here last week without curtailment despite shrinking stocks of coal and coke. Reserves vary, but an early effect on steelmaking and rolling schedules is indicated in the district unless coal mining is quickly restored to normal.

Birmingham—Prospects for sheets appeared increasingly dismal this week in view of slashed ingot production. Although little if any production of the item has been lost thus far, the outlook for the week is far from reassuring as sheet users renew their efforts to get whatever additional tonnage possible.

Warehouse . . .

Warehouse Prices, Page 141

Philadelphia — Warehouse trading in March was the heaviest so far this year. From the standpoint of dollar volume, it was the heaviest on a day-to-day basis, as a result of price increases due to mill revisions, although from the standpoint of tonnage volume on such a basis certain leading distributors assert their business was a shade lighter than in February. Until the end of last month sales were not affected much one way or the other as an indirect result of the coal strike, nor were incoming shipments from the mills.

Chicago—All categories of steel products distributed by warehouses are in strong demand, but the procession is led by flat-rolled items, particularly sheets and strip. Plates also are scarce. Inventories are extremely low and unbalanced and mill receipts are moved out to customers as fast as received. Among other items difficult to maintain in stock are carbon and alloy bars and structural shapes. Customers sense that the stoppage in coal mining will shortly curtail mill output of rolled steel and appear anxious to acquire all they can lay hands on. Warehouses are in poor position to meet this pressure.

Cincinnati—Steel jobbers so far have not felt much impact, either in demand or volume of mill shipments, because of the coal mining situation. April receipts likely will show the effects. Greatest pressure for deliveries is on plates and sheets, with no surcease in customers shopping for any usable tonnage.

Steel Bars . . .

Bar Prices, Page 138

Pittsburgh—Bar sellers have not yet experienced significant revisions in specifications or any increase in new orders that can be traced to an indicated increase in production of war materials. The relatively recent sharp upturn in demand for alloy bars is said to reflect primarily a balancing out of customers' inventories with that of projected production schedules. Many consumers are placing orders in anticipation of an indicated reduction in alloy bar supply for civilian goods consumption as a result of the ERP and indicated substantial increase in military requirements. Delivery schedules in most grades of open-hearth alloy bars are now extended three to four months. Cold finishers similarly have experienced an uptrend in new business and likewise report order backlogs have become further extended. Demand for carbon merchant bars had held relatively stable in recent weeks, although producers state that due to restricted production earlier this year a substantial carryover tonnage must be cleared up in the second quarter.

New York—Hot carbon bars producers are letting their second quarter consumer quotas stand for the time being pending developments in the coal dispute. Should the miners' strike continue for another week or two, delivery promises will have to

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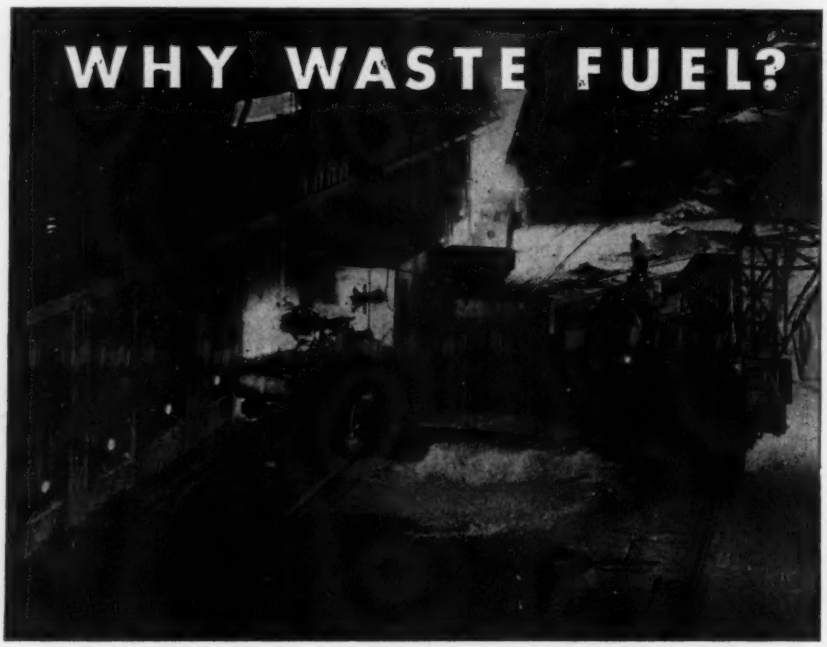
be revised rather sharply. The situation in practically all sizes of hot carbon steel is tight for the current quarter. Some tonnage in the larger sizes might be picked up for delivery before the end of the period, but even that would require some shopping around. To date none of the producers is booking anything beyond June. In cold-drawn bars, sellers are accepting tonnage for delivery over the last half. This is true also in alloy bars, although there has been little demand for that position so far except in some of the smaller sizes, with certain producers having little to offer before August.

Philadelphia — Bar mill operations are tapering as a result of the coal dispute, with shrinkage in bessemer output beginning to be seriously felt by cold drawers and merchant pipe makers. This development, combined with expanding demand, has placed some cold drawers in a position now where they are quoting little in the way of carbon material before mid-summer. However, others are still in somewhat easier position. Alloy bar deliveries continue to expand, with one large producer out of the market completely on hot alloy material until August, regardless of size or analysis of the bar. Deliveries on cold alloy bars are less extended, although backlogs are increasing. Once the defense program gets under way, deliveries on all alloys will tighten appreciably. Hot carbon bar sellers continue to adhere largely to their policy of quoting on a quarterly basis. Some, in effect, are quoting on a month-to-month basis, but they are the exception. Consequently, none has opened books for shipment beyond the second quarter.

Chicago — Outstanding feature of the bar market is the increasing demand for alloy grades, the latter now showing a tightness similar to that which carbon types have shown for months. Reason is not immediately obvious, except that manufacturers of all civilian goods are pressing production to the limit of materials available. Forge shops reflect this high degree of activity and here too is found an increased emphasis for alloy steel. The tight bar situation applies not only to hot-rolled products, but to cold-finished as well.



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Structural Shapes . . .

Structural Shape Prices, Page 139

New York—Public work continues relatively more active than private work. However, there is a fairly good sprinkling of private inquiries and in general the market is reasonably brisk. At the moment awards involve little over 500 tons, although the Governor Alfred E. Smith housing development, involving 7000 tons, may be placed shortly. As noted in a recent issue, Bethlehem Steel Co. is low bidder.

Shape mill operations are being curtailed by continuation of the coal strike, which is limiting the supply of steel, and as a result deliveries to the fabricating shops may be delayed in important measure, especially if the mine tie-up continues much longer. Meanwhile, some of the larger shops have extended their delivery promises to around five to six months.

Boston — Outlook for a further tightening in structural steel is reflected in likelihood of some rescheduling in second quarter which will lower tonnage, notably to warehouses. The freight car building program will draw off a substantial volume. Inquiry for fabricated steel outside of bridges is light, although contracts for smaller projects are fairly well sustained. Close to 4000 tons is up for bridge estimates while a store and warehouse, Dedham, Mass., takes 850 tons. Delivery frequently swings the award of structural contracts with few shops able to better four months.

Philadelphia — While district structural demand is only moderate, fabricating shops have heavier backlogs than a month ago, reaching out in various directions for tonnage. Certain of the larger fabricators again have extended their delivery promises to around six months. Meanwhile, shape deliveries are lagging somewhat, as a result of suspension of coal mining, although not too seriously up to now.

Provident Mutual Life Insurance Co., Philadelphia, contemplates the construction of a $12 million housing project in East Oak Lane, that city.

Seattle — Proposed addition to the Zellebach paper plant at Camas, Wash., is expected to be up for figures soon, the project involves 1100 tons of shapes. Other jobs pending include an Oregon state bridge and a Washington state steel girder span. Fabricating plants report inquiry less brisk.

Tubular Goods . . .

Tubular Goods Prices, Page 139

Pittsburgh — Pipe producers enter second quarter with considerable carryover tonnage, representing nearly one month output in a few instances. Some interests will not attempt to make this tonnage up by reducing customers' monthly allotments until early third quarter. It is reported that pipe shipments for the Saudi-Arabian line have been at least temporarily discontinued. Consideration is being given to sharply stepping up construction of oil tankers. At least one interest along with Worth Steel Co. is planning to soon begin producing line pipe. Producers of carbon tubing report well sustained demand and in some instances order backlogs have become further extended. Alloy tubing and drill pipe are in better supply, but order backlogs remain well extended. Some interests continue to produce line pipe on their tube mills.

St. Louis—Butt weld pipe in sizes 3 inches and under continues acutely scarce, with pressure for deliveries progressively increasing. Demand for housing sizes is mounting sharply as clearing weather spurs residential construction. Pipe dealers have short inventories, made especially low since many outside mills have withdrawn partly or wholly from this territory. Laclede Steel Co. and National Tube Co. are virtually the only regular suppliers for this district. No defense orders are on local mill books yet, but the trade hears rumors of steel orders to be placed by the government soon for buildings, war equipment and munitions. Railroads have increased pressure for cars, and consequently pipe, but doubt that the so-called voluntary allocations can be filled, so have little hope for extra pipe tonnages. Pipe mills have been producing at capacity many months without making perceptible dent in demand.

Seattle — Cast iron pipe inquiry is limited because of slow deliveries aggravated by the eastern coal strike. Deliveries generally are based on 24 months, although competing types are promising speedier shipments.

Worth Steel To Produce Large Diameter Steel Pipe

Claymont, Del. — Worth Steel Co. is planning the manufacture of steel pipe of large diameters ranging from 20 inches O.D. to and including 36 inches O.D. The pipe will be roll bent in 20 foot lengths and welded by the submerged arc process. The pipe can be expanded in 20-foot lengths and can be shipped in 40-foot lengths by making one girth weld. The mill will be capable of producing pipe having a minimum diameter of 12 inches.

Construction has begun and machinery has been ordered which, it is hoped, will enable production to begin early in August. Though in a position to furnish steel to meet high yield point specifications, it is anticipated that initial orders will be taken in mild carbon steel.

Steel plates produced by this company will continue to be allocated to its usual domestic customers, a relatively small percentage being diverted to this new product. Thus far, no commitments for the sale of pipe have been made.

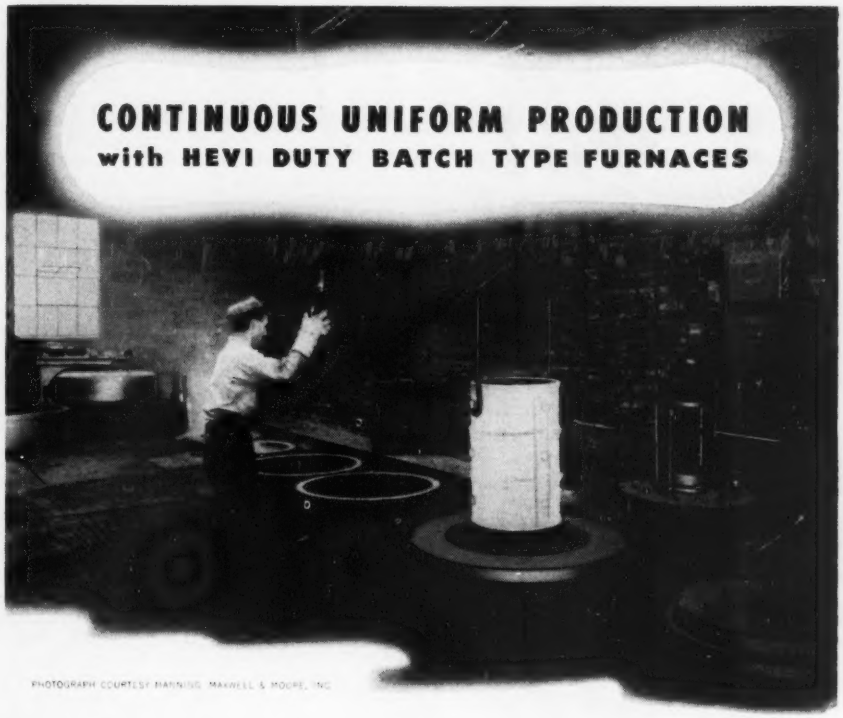
Plates . . .

Plate Prices, Page 139

New York—Tank makers report an increasing demand, particularly from the oil industry. Considerable work is in prospect, although recent orders have not been in large volume. Socony-Vacuum Oil Co., this city, has a $100,000 modernization program pending for Staten Island which will be confined principally to construction and repair of work at Port Socony; however, it has another program there which involves the building of gasoline storage tanks.

Plate production has not as yet been badly affected by the coal strike, but will be shortly should the mine tie-up continue. Practically all producers entered the new quarter with a substantial carryover. Some estimate that they are behind at least six weeks on tonnage promised for delivery during the first quarter of this year.

Pittsburgh — Diminishing tonnage of plates for normal commercial uses is indicated over the coming months. Producers are scheduling a large portion of total output for railroad freight car and tanker construction programs



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and for large diameter pipe. At least two new interests will initiate production of large diameter electric welded pipe this year. Demand supply relationship in carbon plates is just as unbalanced as in sheets, with constant heavy influx of new orders for barges, stand-by fuel tanks and industrial machinery, in addition to programs previously mentioned. Interruption to production schedules earlier this year, has resulted in about a month's carryover tonnage, further tightening plate supplies. Additional disruption to plate production soon is expected should the coal mine walkout continue.

Birmingham—One prospective new plate user has abandoned plans for the district since being told that materials are not available. Production has been maintained and remains steady, but the supply situation still is considerably out of balance with demand.

Seattle — Increasing scarcity of plates is being reflected in reduced shop operations in this area. No large tonnages are up for figures but plants report a fair run of small jobs. Restriction of output at eastern mills is being reflected here in delayed shipments and refusal of new orders. One large fabricator in this area for these reasons has been forced to ask an extension for a water pipe line at Ellensbury, Wash.

Washington state has plans ready and will call bids soon for the proposed $1.8 million Yakima river bridge at Wenatchee.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 138

Pittsburgh—Reinforcing bar producers enter the second quarter with two to four weeks carryover tonnage, which in some instances will not be made up until early in the third quarter. Sellers have somewhat larger order backlogs, reflecting failure of new inquiries and awards to decline as anticipated by some interests and interruptions to production schedules earlier this year. Structural fabricators' order backlogs also continue well extended. In most instances steel supply is the major limiting factor in their operations. Considerable tonnage of reinforcing steel is involved for U. S. Engineers' flood control projects.

Seattle — Rolling mill operations are as near capacity as conditions will permit. The volume of reinforcing bar orders is practically equal to output so that little headway is being made against backlogs. New business is mainly in small jobs, although public works are adding to the total. The largest contract pending involves 850 tons for the Veterans hospital, Spokane, general contract to Robert E. McKee Construction Co., Los Angeles.

Wire . . .

Wire Prices, Page 139

Birmingham—Wire output has held at virtual capacity, but not much of an encouraging nature can be said about supplies, which lag behind demand. Jobbers continue to cry for nails and fencing, particularly, and wire processors are short, as usual, of normal requirements.

Pig Iron . . .

Pig Iron Prices, Page 140

New York — While March shipments of pig iron to district consumers were better on a daily basis than in February, the outlook for this month is less encouraging, although much will depend upon how soon the coal controversy will be ended. Were it to be ended promptly, there would still be a chance for blast furnaces to make up the lost ground, but even that is problematical. Some units, instead of merely banking, have taken the occasion to close down for repairs. On the other hand, if the situation clears quickly in the bituminous field, furnaces in operation might be able to step up their output by virtue of the fact that scrap and coke shipments should be seasonally better, with winter weather behind them. Actually, district foundries are handicapped more at the moment by shortage of coke than by pig iron, which has been the situation for some weeks. But let the miners get back to work and the situation with respect to fuel might change quickly, with mild weather at hand.

Boston—Foundry melt is off slightly in some directions and cast scrap is freer, but there is no improvement in pig iron supply, demand being well in excess of available tonnage. High ratio of scrap in melts prevails and while the cost of cast is below the last peak, price is still in excess of iron. Bulk of tonnage comes from the district furnace salted with limited shipments of silvery and specialties from the outside, mostly from the Buffalo area. Melters of basic see no improvement at current high steel operating rates with coke and other raw material shortages intensifying the hand-to-mouth supply schedules.

Philadelphia — Due to shortage of coke, the Swedeland Pa., pig iron producer plans to take off on Apr. 3 the smaller of its two blast furnaces, the one given over principally to merchant requirements. The Birdsboro, Pa., stack continues to operate at about 90 per cent of normal and is understood to have sufficient coke on hand to maintain this rate until the middle of the month. The largest eastern producer has taken off a blast furnace at Sparrows Point and has set back for the time being the bringing in of its new 1800-ton furnace, which was scheduled until recently to be blown in around the end of March. Pig iron output at all other plants of this producer continues to decline. Foundries, along with steel producers, are having to cut output and in the case of many foundries shortage of coke for their own direct consumption is even proving more of a handicap than shortage of iron.

Pittsburgh — Foundry operations have been cut sharply here due to acute shortages of pig iron, coke, and, to a lesser extent, cast scrap. Some smaller foundries were forced to shut down during the last week to 10 days. Merchant iron sellers expect distribution to become more distorted over the coming months, reflecting an indicated increase in iron shipments to those foundries supplying railroad freight car builders and soil pipe producers. Merchant iron production in this district currently is well below normal, due to producers' efforts to conserve dwindling coal inventories

and also, in part, to other production difficulties at the leading merchant producer's stack.

The increase of 65 cents a ton on Lake Superior iron ore is estimated to represent about $1 a ton increase in pig iron production costs. However, leading interests are not expected to take any price action on pig iron, at least until their coke costs have been determined under the forthcoming coal miners' contract.

Buffalo—Pig iron output and foundry operations suffered further cutbacks as a result of the coal strike. Bethlehem's Lackawanna plant banked one blast furnace and reduced the wind on five other units, causing an overall cut in total tonnage of 50 per cent in the last two weeks. The latest cut follows an original slash of one-third a week ago. Coke operations were also pared beyond the 25 per cent initial reduction. While 14 out of 16 stacks in the area are producing, tonnage has been cut to 75 per cent of capacity. Other producers plan cutbacks shortly if the miners strike continues.

Foundries are also hit. Lack of coke forced the American Radiator & Standard Sanitary Corp.'s Buffalo Bond plant to suspend operations completely.

Shortages of ore and stone are also contributing factors to slower operations. Hopes are held that the opening of the navigation season will soon alleviate these shortages. One leading producer has been bringing in ore by rail to avoid a production setback.

Leading merchant iron sellers report the current month's bookings are about the same as the previous month's with many foundries in desperate straits. Some smaller foundries have requested immediate delivery of their allotments as suppliers are exhausted.

Chicago — Foundries face a disheartening outlook for April for it is obvious now that only a quick termination of the coal mine walkout can prevent a sharp cut in their quotas of both pig iron and coke. Up to now coal stocks have been sufficient to keep all blast furnaces and coke ovens in this district operating, but each day of mine idleness makes more certain that drastic curtailments must be ordered early in April. Foundries have been depending upon current shipments of both iron and coke to keep going, consequently any interruptions to shipments will force immediate curtailments or suspensions.

Cleveland — Republic Steel Corp. was to blow out its blast furnace at its Canton, O., works last weekend for relining. The stack, with daily capacity of around 650 net tons, is expected to be down around 50 days. It was last relined in 1944. Demand for merchant pig iron continued unabated last week. Prices held unchanged.

Cincinnati—Shipments of merchant iron have slowed, sending the foundry melt still lower. Some producers of foundry oven coke are meeting commitments, but unable to spread supplies to melters deprived of coke from other sources. Lack of coal threatens a shutdown this week at a Martins Ferry, O., blast furnace which would react in a few days on steelmaking at the Newport Rolling Mill Division,

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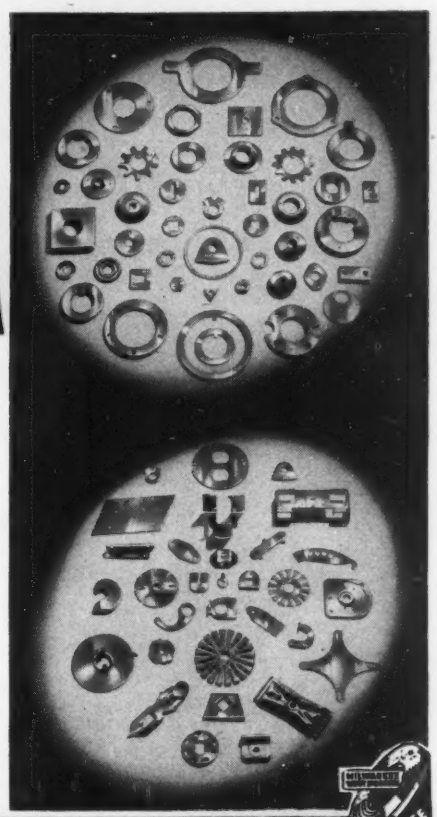

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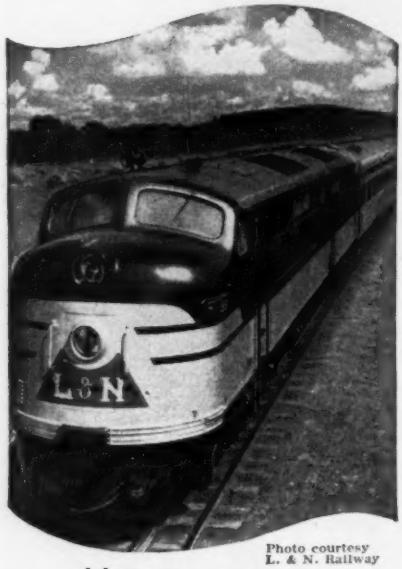

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International Detrola Corp., at Newport, Ky.

Birmingham—Matters go from bad to worse in pig iron. District production by iron-dependent industries is seriously threatened by removal of two merchant furnaces, one at Woodward and one at Republic.

St. Louis—Pig iron output remains at the 1000-tons a day capacity, with no immediate prospect the coal strike will curtail Missouri-Illinois Furnaces Inc., chief supplier of this district. Company's coke ovens are down 20 per cent however, but coke is on hand or available to run the furnaces through April. Some southern Illinois coal is coming in from mines manned by the independent Progressive Mine Workers union, and considerable coal was stockpiled ahead of the strike. Prospects of obtaining additional coke from outside sources in the north and east remain good, so no serious furnaces curtailment is expected any time soon.

Iron prices have gone up 10 to 15 per cent temporarily, due to the fact Missouri-Illinois is passing along to its customers part of the increased freight cost of bringing in outside coke. This premium will be eliminated, however, when the coal situation returns to normal.

Russia Supplies Bulk of Chrome; Stockpile Low

Forty-six per cent of the United States' supply of chrome ore is now coming from the Soviet Union, Charles W. Merrill, chief, Bureau of Mines' metal economics branch, testified before a House subcommittee investigating stockpiling of strategic materials last week.

This country, he said, is "trying to accumulate a five years' supply in one year," and the present chrome stockpile is sufficient to last only five months. United States production is only 7 per cent of consumption, with the remainder largely supplied by Russia, Turkey and the Union of South Africa.

Tin Plate . . .

Tin Plate Prices, Page 139

Pittsburgh—Tin plate producers have a relatively small carryover tonnage for second quarter delivery. Overall output of this product is expected to hold steady compared with 1947 at about 3.7 million tons, despite an increase in theoretical capacity scheduled to become operative this year. Pressure for delivery of all types of tin containers shows no signs of abating, especially for perishable food items. Assertion of Continental Can Co. that relatively small amount of pig tin would be saved under revisions of order M-81 has been supported generally by the trade in the past. However, the steel industry is said to have officially supported the government in its contention for the need of extending tin controls.

Chicago — Tin mill operations of Inland Steel Co. are completely closed down as result of a labor dispute which started two weeks ago. The dispute caused progressive reduction in output of both hot dip and electrolytic plate during the first week, resulting in full suspension the second.

Iron Ore . . .

Cleveland-Cliffs, Pickands, Mather advance ore prices 65 cents above 1947 level

Iron Ore Prices, Page 140

Cleveland—Two Cleveland iron ore sellers, Cleveland-Cliffs Iron Co. and Pickands, Mather & Co., have announced prices for the 1948 season's sales of Lake Superior iron ore. The new prices are 65c a gross ton above those of last year. Other ore sellers have not yet set 1948 prices.

Both companies have sold considerable tonnages for delivery this year at prices based on $6.20 per gross ton delivered at lower lake ports for Mesabi range nonbessemer ore, 51.5 per cent iron natural content. Prices of other grades are: Mesabi bessemer, $6.35; old range nonbessemer, $6.45; old range bessemer, $6.60; and high phosphorus, $6.20.

In announcing the new prices Cleveland-Cliffs explained that during the war years iron ore price was held under price control at such a low figure that this new 1948 price is only 25.3 per cent above the 1939 price. This, said the company, compares with other price increases in the period from 1939 to 1948 as follows: Steel, 44.6 per cent; pig iron, 73.3 per cent; wholesale commodity prices, 106.5 per cent; scrap, 128.5 per cent; and coke, 163.2 per cent. In the same period, average labor earnings per hour of the company's employees increased 83.5 per cent.

Only a comparatively small percentage of total Lake Superior district ore used in steelmaking is purchased by the steel companies, the balance being mined by them from their own properties. "Accordingly, only that small percentage of steel production is affected by the increase in the price of ore. But even if the 1948 season's ore price increase affected the cost of all steel production, this increase would add less than $1.50 to the cost of a $1500 automobile; less than 12 cents to the cost of a $285 electric refrigerator and about 5 cents to the cost of a $130 washing machine," Cleveland-Cliffs pointed out.

War requirements for iron ore and the continued demand since has required such an abnormal production, particularly from open pit mines, that greatly increased tonnages must hereafter be produced from the higher-cost underground properties and from low-grade deposits requiring additional expense of beneficiation to produce a product suitable for blast furnace use.

"If the mines are to be encouraged to produce an adequate ore supply to meet the heavy demands of the steel industry and help relieve the shortage of steel, the price of ore must necessarily reflect fairly the increased costs of labor, material, transportation and changed mining conditions which require the production of increased percentages of the higher cost underground and beneficiated ores," Cleveland-Cliffs declared.

Scrap . . .

Easier price tone develops in cast iron scrap in east as demand weakens

Scrap Prices, Page 144

New York — With a number of leading foundries out of the market as a result of shortage of coke and pig iron, scrap brokers have reduced prices here on some of the leading cast grades. Brokers are now paying $56 to $58, fob shipping point, for No. 1 cupola cast and $54 to $55 for charging box cast and heavy breakable. This is a decline of $2 on cupola and approximately $1.50 on the latter two grades. Unstripped motor blocks and malleable prices are unchanged.

Brokers are buying all grades of steel scrap at unchanged prices. So far demand has continued strong, notwithstanding the suspension of soft coal operations. However, should there be no early settlement in the mine controversy, it is expected that certain consumers, especially in the Pittsburgh district, will either start holding up shipments because of limited storage facilities or will reduce their offerings so as to cover extra charges necessary in providing additional facilities.

Philadelphia — Consumers of open-hearth scrap continue to take all tonnage offered and place orders for more. How long they will do this, should the coal strike continue, is a question. However, some trade leaders believe that most consumers would take in all available tonnage for another week or two, even though the mines should remain closed. They take the position that the tone of the scrap market has definitely firmed since the President made his address Mar. 17 on the need for defense preparation, and that, while milder weather is now at hand, there is not the likelihood at present of a break in the formula prices that appeared imminent at the time. On the other hand, some large consumers assert that there will be a limit to their present policy, and that it may not be too far off. Their stocks will be in much better shape than when the coal strike began and, consequently, they believe they will be abl to at least wait for a while and see how much stimulus mild weather will give the movement of scrap and how much market weakness might develop as a result.

Of the 75,000 tons of German scrap being offered by the Army for bidding in May about 90 per cent is said to be alloy scrap. Consumers say they have relatively little or no need for this type of material, that what they need is carbon steel scrap.

Pittsburgh — No large scrap purchases have been reported in recent weeks and none is expected as long as substantial tonnage on previous commitments remain unshipped. Likelihood of a sharp drop in steelmaking operations next week should the coal mine walkout continue is cited as another reason for mills not placing large tonnage orders at this time. However, buying of small lot tonnages is continuing on a limited basis. Some remote scrap is shipped here at above the $2.40 springboard at which the bulk of this type of scrap is moving. Mills report scrap inventories have

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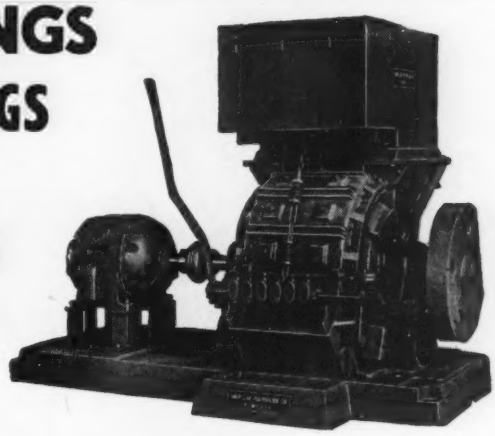

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been increased in recent weeks. This trend should become much more pronounced in event of further curtailment in ingot production schedules. Fact that mills contend they will not attempt to offset pig iron shortage by increasing scrap ratio in their open-hearth melts, plus somewhat better scrap supply outlook as a result of more favorable weather for collection and segregation efforts, would normally tend to soften the price structures. However, prices of steelmaking grades have not shown any indication of weakening.

Boston—Heavy movement of cast scrap has halted buying by most large consumers and resulted in lower prices. Inventories are generally heavier and interest is centered more in outside offers at $50 to $52, shipping point. Steel scrap is moving, with few exceptions, at formula prices. Among them are prices paid for 600 tons unprepared melting steel at the Boston Navy yard by an Albany, N. Y., interest, $34.52 against a formula of $31.90. Most dealers bid under the latter for this lot.

Cleveland — Reflecting increased use of scrap by steelmakers and foundries to stretch pig iron supplies in view of the coal strike, the scrap market last week was of stronger tone. However, with continuation of the coal miners' work stoppage threatening to seriously curtail steel and foundry production there was a feeling the strength in the scrap market would melt quickly, possibly dropping prices. It was believed, however, any price drop would last only until steel production was resumed, in view of the heavy demand for steel.

Despite the firmness in the scrap market last week, prices remained unchanged, inasmuch as improved weather has helped increase the flow of scrap.

As an experiment, Luria Bros. & Co. Inc., scrap dealer and broker, has signed a contract to remove street car rails from sections of four Cleveland streets. The company is paying only $1 for the tracks but will pay the expense of removing them and covering the track area with a concrete fill. Yield is expected to be 1300 tons of scrap.

Chicago — Scrap market here continues to hold its strength despite fact that steel mills are making no move to buy in a major way. Prices are essentially unchanged and nominal. Receipts against old orders are in good volume and are fully equal to consuming needs. Indications are that steelmaking operations will be maintained close to present near maximum level at least until around Apr. 10 even if coal mines remain idle. Should curtailment become necessary, it is not expected that mills would let that situation interfere with their intake or purchase of scrap.

Buffalo — No appreciable changes were noted in the underlying status of the scrap market last week despite considerable excitement over effects of the coal strike. The fact that Bethlehem has ten idle furnaces at Lackawanna is a strengthening factor in the scrap market as increased scrap supplies are needed to make up for a 50 per cent slash in pig iron operations. Dealers and consumers were hoping that effects of the coal strike on the railroads would not interfere with shipments. Apprehension over this possibility also offset talk of easier tendencies. There was some pressure brought to bear for lower prices on No. 1 heavy melting because of reciprocal deals. Sources downstate were reported shipping on allocations in reciprocal deals at $39.75, which is the No. 2 formula price. However, on outright sales the No. 1 price was $42 to $44.

Fresh strength swept the cast market. Sales of No. 1 mixed cupola were reported within a range of $62 to $65, an increase of $4 to $5. On the other hand, added offerings of low phos tended to ease this item with prices about $1 to a range of $44.75 to $46.

Detroit — Bolstered by the war hysteria and by the fact that Ford Motor Co. continues an active buyer, prices are holding firm at the formula level. Many had expected a decline but news events have had a stimulating effect which could wear off shortly.

Cincinnati — Scrap quotations remain unchanged. Demand for material is active, the overall needs not visibly cut by request from some foundries for suspension of shipments until they can acquire coke. Seasonal factors are aiding in a better flow of scrap.

St. Louis—Scrap prices hold firm, with uncertainty over the future still prevailing. Shipments continue fair under improving weather conditions. Steel scrap supplies are noticeably better, but mill inventories apparently are unable to climb above 30 days—insufficient to risk an attempt to withdraw and drive down prices. Cast is as scarce as ever. An Ohio melter last week offered $5 over the $65 quotation here.

Seattle — Steel scrap situation is improving. Large shipments are arriving from the country, stimulated by the higher level of $26 gross and moderate weather. Mills are adding slightly to inventories and hope to further increase yard stocks. Sale of 44 LTS vessels at Puget Sound and California ports by the Maritime Commission Apr. 13 will add about 50,000 tons to the potential supply in this area.

Rails, Cars . . .

Track Material Prices, Page 139

New York — Chesapeake & Ohio closed bids Apr. 1 on up to 3000 seventy-ton hopper cars. This, along with an inquiry for 1000 to 4000 fifty-ton hopper cars for the Louisville & Nashville, features car demand. No outstanding awards have been reported over the past week.

Cleveland—The government's railroad car directive has been broadened to channel materials to manufacture and repair of mine cars. The program also covers new domestic freight cars for use in industrial plants; and repair of freight cars, passenger cars and locomotives. It does not include the building of new passenger cars or locomotives.

Birmingham—Production of vitally needed rails was suspended at the Ensley mill of Tennessee Coal, Iron & Railroad Co. here Thursday when the mill went down on account of the coal strike.

Canada . . .

Toronto, Ont. — Steel production in Canada is being maintained at virtual capacity and shipments to consuming plants are at record levels, but despite these facts there has been comparatively little easing in the supply situation. Although there are prospects for minor relief during second half of this year in some lines, it is not expected that supply and demand will reach anything like an equal basis before 1949. At present, Canadian steel producers are giving serious thought to substantial plant enlargements, including blast furnaces, coke ovens, open hearths and finishing mills, but expansion programs of this nature will take from a year to two years to complete.

Labor unions are seeking new agreements and higher wages and strikes are threatening in steel mills. However, it is believed that satisfactory agreements will be reached and there will be no walkouts. While Canadian iron and steel prices under government control have shown no change this year, higher prices are expected in event of any substantial jump in labor costs.

On most items Canadian steel makers have no surplus capacity available during second quarter and some have withdrawn from the market on a few of the scarce items.

Steel sheets are in short supply with no prospect of easing before third quarter and then it is doubtful if there will be much improvement in supply.

Gray Market Steel Prices Stronger

Pittsburgh — Gray market steel prices have been strengthened as result of anticipated increased shortages resulting from the coal mine idleness, greater shipments to Europe under the Marshall Plan and larger allocations for military preparedness.

Current offering prices for hot-rolled sheet exceed $200 a ton. Hot-rolled annealed sheets, pickled and oiled, recently have been sold at above $250 a ton.

Definitely stronger prices are noted for pipe, plates, nails and other products.

Firms Await Defense Orders

Government resurveying industry's facilities but has not accelerated purchases. Demand expected to center at first on alloys, production of which is increasing

Cleveland—In response to continued strong demand for alloy steel, Republic Steel Corp. has put additional alloy-producing facilities into operation at Canton, O., and Chicago.

Republic, which recently put two out of five government-owned electric furnaces into operation at its Canton plant, now has four in use there and possibly may start operating the fifth soon. These four furnaces supplement Republic's own alloy-producing facilities of six open hearths and 13 electric furnaces at Canton. Each of the five government-owned furnaces has a rated capacity of 70 net tons per heat and is larger than any of Republic's own electric furnaces at the Canton works.

Until the recent upturn in alloy demand, Republic had used some of its electric furnace capacity at Canton to produce carbon steel in an effort to fill civilian requirements. The government-owned electric furnaces, which until recently had not been used since the war, are being operated on a tonnage-payment basis.

At Chicago, some new alloy producing facilities built during the war, but not needed because of a change in war needs, are now being operated by Republic, thus giving the company a greater alloy production there than during the war. At its Chicago works, Republic has available for alloy production eight open hearths in its old shop, and four open hearths and four electric furnaces in its new shop. In addition, two more electric furnaces there may be put into operation soon. Each of the six electric furnaces has a rated capacity of 70 net tons per heat.

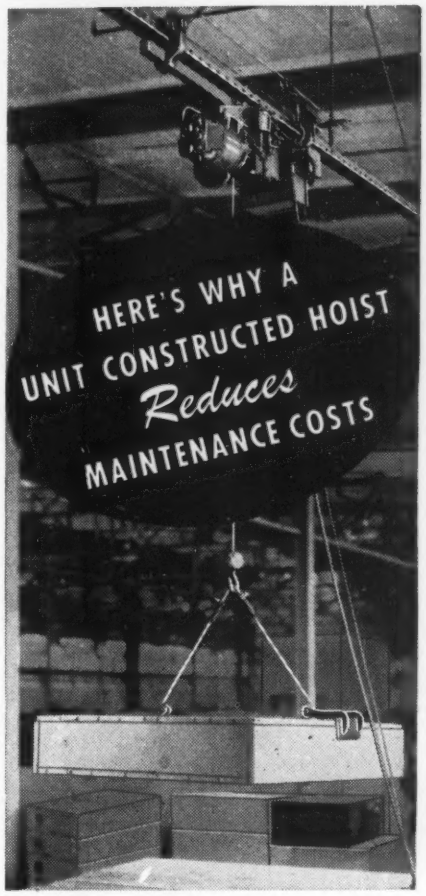
Rate at which Republic expands its electric furnace operations is governed somewhat by its success in obtaining and training additional personnel for such work.

The recent surge in demand for alloy steels has extended deliveries as far as August. While the bulk of this demand stems from civilian requirements, military preparedness needs have begun to account for some of it. Republic, for instance, receiving orders for high-grade electric furnace alloy steels for aircraft engines.

Youngstown—The government has begun marshalling Youngstown district industrial plants for a national emergency. Already resurveys of a number of plants which turned in good war production performances have been made; more are under way. The physical condition and health of top executives are even being checked. No unusual defense orders have been placed.

The impact of possible defense buying on steel supplies is causing concern here to fabricators and steel consumers alike. New defense orders, piled on top of other needs, would create an acute shortage.

Los Angeles — All branches of the armed forces have launched an intensive survey of industrial capacity throughout the West. Instances of increased military procurement are difficult to cite. The Metal Trades Association of Los Angeles, however, reports aircraft firms are asking for pattern makers through the association's employment bureau. At the same time, the Army issued orders last week for a complete roundup of all western capacities. Much of the renewed activity centers on aircraft. Lockheed has issued a standby request to many ex-clerical workers now em-



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ployed in other fields. It also is known that North American and Northrup have received new plane development orders lately.

New York — While district airplane manufacturers are beginning to take on more help and are showing a livelier interest in steel, particularly in some of the alloy specialties and stainless sheets, there is little buying so far that can be ascribed to plans for accelerating the defense program. Most inquiry at present is more a matter of sounding out the position of various producers with respect to delivery promises and supply than of issuing firm specifications. Certain of the military branches, particularly the Army Signal Corps, are likewise feeling out the situation and in some cases have stepped up orders, especially for electrical sheets.

Government arsenals are specifying more freely, but there has been no broad or important action up to now.

Pittsburgh — Steel producers and metalworking companies likely will receive a steadily rising volume of inquiries and orders for war materiel in the months ahead. However, to date no significant increase in inquiries or orders for such items have been noted here. Some steel producers report substantial upturn in demand for both stainless and alloy steels, due at least partially to step-up in output of military planes. One interest has received an inquiry as to what deliveries would be available on armor plate.

Detroit — Effects of war hysteria have been reflected sentimentally in this area, although it is still too early, and future plans too indefinite, to be translated into terms of actual armament business. Steel suppliers in scattered instances report an acceleration in the placing of new tonnage, result of buyers wanting to get orders on books more than anything else—just in case. Screw machine parts producers, for instance, have stepped up steel buying, and some cold drawn bar sources say they are now sold out until August. Alloy bar business is more active.

A moderate tonnage of assorted steel, no single item running over a couple of tons, has been placed by the Detroit Tank Arsenal which is carrying forward its experimental and development programs on mobile ordnance.

Automobile plants have received no military contracts, nor do they expect any beyond possible "educational" orders. One auto plant was approached by a leading electrical manufacturer on the possibility of subcontracting certain parts, believed to be for aircraft turbojet engines. Since no appropriations are available for accelerated military procurement, no early release of contracts is expected.

Chicago — Metalworking industry has not as yet been asked to produce or figure on producing armament or equipment in connection with an expanded national defense program. The military reportedly has feelers out for shell steel, but confirmation is lacking. Some manufacturers are now and have been since World War II supplying modest quantities of goods to military uses. Much of this has been aircraft work for new types of planes, particularly jet propelled. In addition, research programs are being conducted to develop and improve armament, communications equipment, and the like, just to make sure that the nation has the best to be had.

U. S. Industry Sizing Up New Military Program

(*Concluded from Page* 46)

isfy the demand for new automobiles, the average age of which is now about 9½ years compared with about 5 years just prior to the war.

Aircraft Capacity Available—Bulk of the material expenditures in the program as now planned would be for aircraft development, research and procurement. Seven and three-quarter billion dollars are earmarked for aircraft, against $1.5 billion for other materiel.

The aircraft industry now has available 53 million square feet of manufacturing space, compared with 13 million in 1939. During the wartime peak, the industry had 175 million square feet of active manufacturing space.

The aircraft industry now is estimated to have 250,000 workers, compared with 76,000 in 1939. During the war, a peak of 1,700,000 was reached. Many of these were trained in aircraft manufacturing and could be drawn back to the labor force if necessary. The training program would be less of a problem than in the early 1940s.

When Boeing Aircraft Co. started to reactivate its large bomber plant at Wichita, Kans., preparatory to turning it over to the Army, it received 2500 applications for 1000 jobs, although a shortage of skilled technicians was noted.

Steel Demand Increases—Pressure on steel companies for steel deliveries has stepped up moderately since the expanded military program was announced. Especially is this true of alloy steel which a few months ago was lagging. Electrical sheets are in more active demand. Screw machine parts producers have stepped up buying and some suppliers of cold-finished bars are sold out until August.

Few actual orders for military account have been placed as yet, and these generally are small. Inquiries sounding out producers as to delivery and supply position have increased. In some cases, plants have been visited by military personnel who are checking up on facilities and even on the health of top executives.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2500 tons, sheet piling, dock, Commonwealth Edison Co., Stickney, Ill., to Carnegie-Illinois Steel Corp.; John Griffiths & Son Co., Chicago, contractor.

1600 tons, Carborundum Co., Wheatfield, N. Y., to Bethlehem Steel Co.; A. L. Jackson, Chicago, general contractors.

1260 tons, Bridge No. 2938, Montezuma, Ind., for State Highway Department, to Bethlehem Steel Co.; Robert King, Danville, Ind., contractor.

700 tons, fertilizer plant, Illinois Farm Supply Co., East St. Louis, Ill., to Bethlehem Steel Co., James Stewart Corp., Chicago, contractor.

698 tons, bridge project F, Whiteside county, Illinois, for State Highway Department, to Bethlehem Steel Co.

440 tons, auditorium, Sioux City, Iowa, to Gate City Iron Works, Omaha, Nebr.

400 tons, temple, Chicago Sinai Congregation, Chicago, to Wendnagel & Co., Chicago.

400 tons, printing building, Long Island City, through Lockwood Green & Co., New York, to Bethlehem Steel Co.

400 tons, chemistry building, Rutgers University, New Brunswick, N. J., through Nak-Bugbee & Co., Trenton, N. J., to Bethlehem Fabricators Inc., Bethlehem, Pa.

353 tons, bridge section 18-F, Clay county, Illinois, for State Highway Department, to Midland Structural Steel Co., Chicago, for fabrication by Allied Structural Companies.

300 tons, bus terminal, Chester, Pa., to Bethlehem Steel Co.

285 tons, plant, Corry-Jamestown Mfg. Co., Corry, Pa., through Walter Kidde, New York, to Bethlehem Fabricators, Bethlehem, Pa.

255 tons, addition, telephone building, New Rochelle, N. Y., to Grand Iron Works Inc., New York.

210 tons, new warehouse, Buffalo, Westinghouse Electric Corp., to Bethlehem Steel Co.; John W. Cowper Co., Buffalo, general contractor.

220 tons, bridge 2943, Madison county, Indiana, for State Highway Department, to Bethlehem Steel Co.

190 tons, addition, Nightingale Hospital, New York, to Grand Iron Works Inc., New York.

185 tons, building, Garden City Envelope Co., Chicago, to Wendnagel & Co., Chicago.

175 tons, plant addition, E. F. Drew Refining Co., Boonton, N. J., to Ingalls Iron Works, Birmingham.

170 tons, curb angles, North American Iron & Steel Co., Long Island City, N. Y., to American Bridge Co.

155 tons, curb angles for work at St. George, Staten Island, N. Y., through B. Turecmo, contractor, to American Bridge Co.

150 tons, schools and miscellaneous projects, to Standard Steel Fabricating Co., Seattle.

150 tons, Washington state bridge, Pierce county, to Puget Sound Bridge & Dredging Co., Seattle.

140 tons, hospital building, Scranton, Pa., to Anthracite Bridge Co., that city.

100 tons, manufacturing building, Bridgeport, Conn., through Fletcher Thompson Co., that city, to Bethlehem Steel Co.

100 tons, addition, state hospital, Fairfield, Conn., Lehigh Structural Steel Co., Allentown, Pa.

STRUCTURALS PENDING

1100 tons, barking and chipping plant addition to Zellerbach pulp and paper mills, Camas, Wash.; bids soon.

1000 tons, power plant extension, Connecticut Light & Power Co., Devon, Conn.; United Engineers & Constructors Inc., Philadelphia, contractors-engineers.

850 tons, store and warehouse building, Stop & Shop, Dedham, Mass., bids closed Mar. 30; Mark Leninthal, Boston, engineer.

652 tons, 2214-foot state bridge Willamette river, Independence, Oreg.; bids to Portland, Oreg., Apr. 20.

500 tons, brewery, C. Schmidt & Sons, Philadelphia; bids asked.

400 tons, approximately, armored telephone

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These advantages reach all the way down to the smallest "V"-Head Cap Screws made. Illustration shows a tiny "Allen" held on a "Handi-Hex" Allen Driver,— fastest fastening combination for small parts. Positive hex-socket wrenching achieves tight set-ups; threading to high Class 3 fit *keeps* them tight. . . Write us for informative data and samples; order of your Allen Industrial Distributor.

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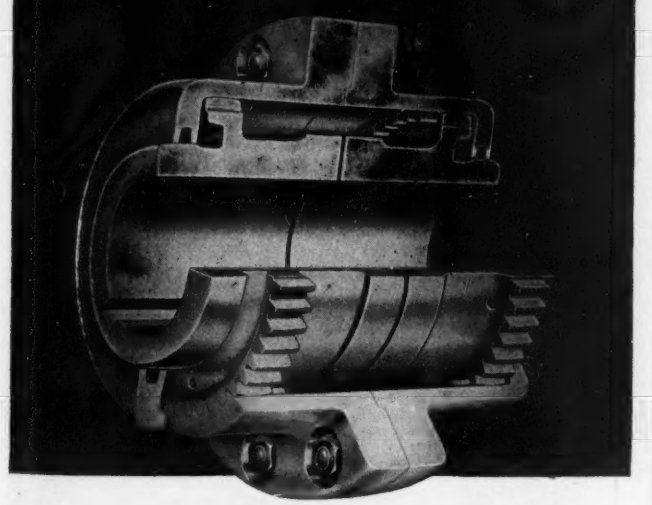

A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

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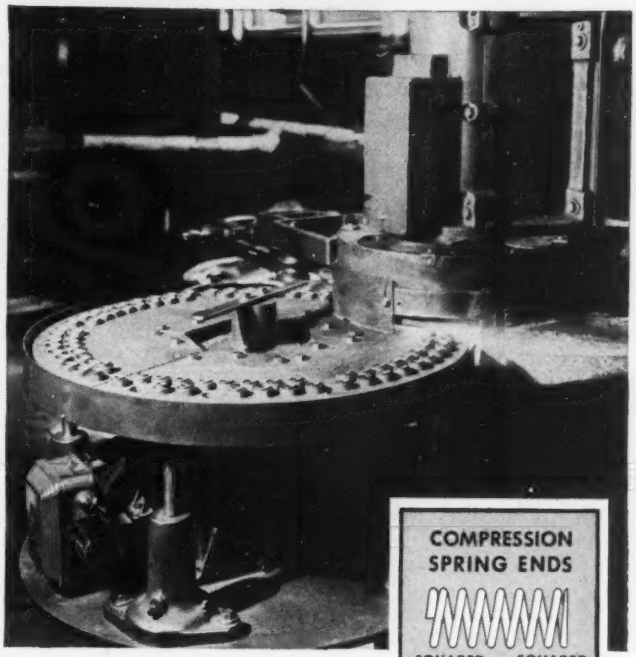
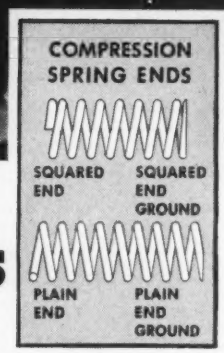
POOLE FOUNDRY & MACHINE COMPANY **WOODBERRY, BALTIMORE, MD.**



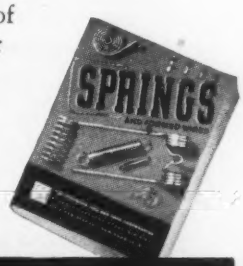


DESTINY THAT SHAPES OUR ENDS

The work which a compression spring is destined to perform is often a factor in determining the type of end to be used. In a high speed valve spring, for example, a close-wound coil added to each end permits grinding of squared ends for bearing surfaces that can stand sudden shock loads and the "surge" to which this type of spring is subjected.

Because accuracy is important, Wickwire employs automatic grinding equipment especially designed to produce flat parallel ends at right angles with the axis of the spring without distorting the end coils.

If you need springs or formed wires, Wickwire can serve in two ways. First, let us send you our free book, "Springs and Formed Wires." It's full of valuable data about spring selection and performance. Second, we offer the services of our spring and formed wire specialists in custom-tailoring the type of spring that meets your specific requirements. For a copy of our free book; for engineering help, or for quotations, write Spring Dept., Wickwire Spencer Steel Div. of C. F. & I., 2 New Bond Street, Worcester 6, Mass.



CF&I WICKWIRE SPENCER SPRINGS

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION THE COLORADO FUEL AND IRON CORPORATION

SPRING SALES OFFICE AND PLANT—2 New Bond St., Worcester 6, Mass.
EXECUTIVE OFFICES—500 Fifth Avenue, New York 18, N. Y.
SALES OFFICES—Boston • Buffalo • Chicago • Denver • New York
PACIFIC COAST—The California Wire Cloth Corp., Oakland 6, Calif.

building, Paterson, N. J., bids Apr. 2; Voorhees, Walker, Foley & Smith, 101 Park Ave., New York, architects and engineers.

315 tons, new building, Allstate Insurance Co., Chicago; bids Apr. 5.

200 tons, high school, Hinsdale, Ill.

130 tons, bridge, proj. F321(3), Thurston City, Nebr.; bids of Mar. 4 rejected.

100 tons, including reinforcing, Washington state bridge, Skagit county; general contract awarded at $55,326.

Unstated tonnage, telephone building addition, Yonkers, N. Y., Vermilya-Brown Inc., New York, awarded general contract.

REINFORCING BARS . . .

REINFORCING BARS PLACED

700 tons, 24 storage silos, Medusa Portland Cement Co., Wampum, Pa., to Carnegie-Illinois Steel Corp.; MacDonald Engineering Co., Chicago, contractor.

300 tons, flood control, East Peoria, Ill., for War Department, to Carnegie-Illinois Steel Corp., Chicago; Central Engineering Co., Davenport, Iowa, contractor.

150 tons, Carborundum Co., Wheatfield, N. Y., to Bethlehem Steel Co.

136 tons, fertilizer plant, Illinois Farm Supply Co., East St. Louis, Ill., to Laclede Steel Co., St. Louis; James Stewart Corp., Chicago, contractor.

122 tons, faculty building, Fenwick High School, Oak Park, Ill., to Bethlehem Steel Co.; William R. Goss Co., Chicago, contractor.

REINFORCING BARS PENDING

1275 tons, building, Research Institute, University of Chicago, Chicago; bids Apr. 1.

Unstated, Astor Banks apartment, Chicago.

850 tons, veterans hospital, Spokane, Wash.; general contract to Robert E. McKee Construction Co., Los Angeles, low $2,460,000; also for additional structures, $297,300.

800 tons, new building, Allstate Insurance Co., Chicago; bids Apr. 5.

350 tons, Goldblatt Memorial Hospital, University of Chicago, Chicago; bids Mar. 31.

350 tons, veterans hospital, Erie, Pa., bids Apr. 6.

260 tons, Oregon state bridge at Independence; bids to Portland, Oreg., Apr. 20.

100 tons, Washington state highway projects; bids to Olympia, Wash., Apr. 9.

PLATES . . .

PLATES PLACED

405 tons, two tanks, East St. Louis, for Socony-Vacuum Oil Co., New York, to Bethlehem Steel Co.

350 tons, tanks, Port Petroleum Co., Albany, N. Y., to Bethlehem Steel Co.

120 tons, fabricated floor plates, catalytic cracker, Carter Oil Co., Hirsch Spur, Mont., to Johnston Iron Works, Chicago, through A. M. Castle & Co., Chicago.

PLATES PENDING

Unstated tonnage, elevated tank and tower, veterans hospital, Saginaw, Mich., Pittsburgh-Des Moines Steel Co., Pittsburgh, low, $55,640.

PIPE . . .

CAST IRON PIPE PLACED

275 tons, 8 and 12 inch for Seattle system improvements, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

130 tons plus, 6 and 8 inch for Ellensburg, Wash., to Pacific Water Works Supply Co., Seattle.

RAILS, CARS . . .

RAILROAD CARS PENDING

Louisville & Nashville, 1000 to 4000 fifty-ton steel twin hopper cars, bids asked.

Chesapeake & Ohio, 1000, 2000 or 3000 seventy-ton triple hopper cars, bids closed Apr. 1.

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

BAKERSFIELD, CALIF.—Standard Oil Co. of California has begun work on the $7,500,000 expansion and modernization program at its refinery here. C. F. Braun Co., Alhambra, has the general contract.

OAKLAND, CALIF.—Superform Products Co. Inc. has been formed by William H. Richmond, Piedmont, with a capital of $300,000 to manufacture tools and dies.

CONNECTICUT

BRIDGEPORT, CONN.—Singer Mfg. Co., 803 E. Washington Ave., has awarded a $500,000 contract to Austin Co., 19 Rector St., New York, for a factory addition.

NORWALK, CONN.—Nash Engineering Co., Wilson Rd., plans to build a factory on Wilson Rd. at a cost of $75,000. Engineer is Fletcher Thompson Inc., 211 State St., Bridgeport.

IDAHO

BOISE, IDAHO—Bureau of Reclamation has awarded J. A. Terteling & Son a $2,500,000 contract for construction of a powerhouse and spillway at the Anderson Ranch dam project near here.

KANSAS

LEAVENWORTH, KANS. — National Battery Co., First National Bank Bldg., St. Paul, has awarded a $100,000 contract to Julius Kaaz, 326 Pine St., for construction of a battery plant addition.

ULYSSES, KANS.—Magnolia Petroleum Co., Wichita, will build a $7,500,000 natural gasoline extraction plant.

LOUISIANA

BATON ROUGE, LA.—General Chemical Division, Allied Chemical & Dye Co., plans a plant at a cost of $2,978,300.

LAKE CHARLES, LA. — Mathieson Alkali Works plans enlargement of its soda ash plant at a cost of $2,978,300.

LOCKPORT, LA.—Valite Corp. will build a $135,000 plant for the manufacture of plastics from bagasse.

MARRERO, LA.—Petco Corp. will build skimming and cracking plant units costing $900,000 and docks to cost an additional $225,000.

MONTANA

BILLINGS, MONT.—Linde Air Products Co., unit of Union Carbide & Carbon Corp., New York, plans to build an oxygen-filling station and acetylene-producing plant here.

NEW JERSEY

SOUTH HACKENSACK, N. J.—Aeroil Products Co., 5701 Park Ave., West New York, has awarded a $375,000 contract to C. A. Hunt Engineering Co., 485 Ft. Lee Rd., Teaneck., for construction of a plant on Wesley St.

UNION, N. J.—Smith Tractor & Equipment Co. has awarded an $80,000 contract to Wigton-Abbott Corp., 1225 South Ave., Plainfield, for construction of a warehouse.

UNION TWP., N. J.—Hanover Steel Corp., subsidiary of Solar Steel Corp., Detroit, has awarded a general contract to William L. Blanchard Co., Newark, for construction of a warehouse and office here.

OKLAHOMA

ALEX, OKLA.—Magnolia Petroleum Co., Magnolia Bldg., Dallas, Tex., plans a $750,000 project to include a natural gasoline recycling plant here and gasoline pipeline from Alex to near Chickasha.

PONCA CITY, OKLA.—Oklahoma Gas & Electric Co., 321 N. Harvey St., Oklahoma City, plans a $3,619,000 turbo generator for its Beerbower power plant near here.

PENNSYLVANIA

ALLENTOWN, PA.—Sears, Roebuck & Co., Roosevelt Blvd. and Adams Ave., Philadelphia, plans to build a $200,000 warehouse.

BLOOMSBURG, PA.—Magee Carpet Co. will build a 2-story machine shop at a cost of $150,000.

ERIE, PA.—Pennsylvania Telephone Corp., 20 E. Tenth St., will spend $590,000 for plant additions.

KITTANING, PA.—Linde Air Products Co., 30 E. 42nd St., New York, will build a 1-story wing to its plant here.

MIFFLIN TWP., PA.—Carnegie-Illinois Steel Corp., Carnegie Bldg., Pittsburgh, has awarded an $85,000 contract to Crump Inc., 4081 Bigelow Blvd., Pittsburgh, for a convenience building.

PHILADELPHIA—Philadelphia Coke Co., 4601 Richmond St., has awarded separate contracts totaling $106,000 for a manufacturing building. Engineer is Rust Engineering Co., Clark Bldg., Pittsburgh.

PHILADELPHIA—Rosenau Bros. Inc., 25th and Westmoreland Sts., has awarded a $950,000 contract to Leonard Shaffer, 926 Walnut St., for construction of a 1-story factory and a 2-story office.

VESTABURG, PA.—Jones & Laughlin Steel Corp. has awarded Westinghouse Electric Corp., Pittsburgh, a contract to furnish all the major electrical equipment for a coal cleaning plant to serve J & L's consolidated #4 and #5 coal mines here.

TENNESSEE

JACKSON, TENN. — Manufacturers Battery Co., L. G. Berigen, president, has secured a site for a proposed $250,000 battery manufacturing plant.

MEMPHIS, TENN. — Westinghouse Electric Supply Co., c/o E. J. McDermott, manager, has awarded a contract to Seth Giem, Porter Bldg., for construction of an office and warehouse.

NASHVILLE, TENN.—Mantle Lamp Co., c/o Victor S. Johnson Jr., 223 W. Jackson, Chicago, has selected Spencer J. Warwick & Associates, 307 E. Fourth St., Cincinnati, as the architect for a $4 million plant on Murfreesboro Rd. for the manufacture of stoves, thermos bottles and lanterns.

TEXAS

DALLAS, TEX.—Southwest Construction Co., 2074 Amelia St., will build a $75,000 hot-mix asphalt plant.

HOUSTON, TEX.—Link-Belt Co. has plans in progress by J. A. Pitzinger & Associates, architects, Dallas, for a two-story building on S. Wayside Dr. Cost will be $500,000.

MC GREGOR, TEX.—Western Holly Stove Co., H. Honer, president, Waco, will spend $425,000 on a project to remodel, repair, and alter buildings for establishment of a stove gas range plant.

UTAH

CEDAR CITY, UTAH—Geneva Steel Co., Geneva, will build a $400,000 power plant near here to provide power for U. S. Steel Corp.'s Columbia Iron Mining Co. which maintains operations in this area.

GARFIELD, UTAH—Kennecott Copper Corp. will build a multi-million dollar refinery near the company's existing mills at Magna.

CANADA

VICTORIA, B. C.—Sidney Roofing & Paper Co. Ltd., Industrial Reserve, has awarded a $100,000 contract to George H. Wheaton, 1207 Douglas St., for construction of a machine room at its plant.

TORONTO, ONT.—Kelton Mfg. Co. Ltd., 225 Jarvis St., has awarded a $120,000 contract to James Bodie Construction Co. Ltd., 456 Pape Ave., for erection of a factory on Davenport Rd.

MONTREAL, QUE.—Canadian National Railroad, B. Wheelwright, chief engineer, 360 McGill St., plans to build a $200,000 plant.